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Extracts from the Journal of an Expedition into the Naga Hills on the Assam Frontier. By Lieut. GRANGE, *Assistant Political Agent, undertaken by order of Government in the beginning of* 1840, *(taken by permission from the records of the Political Secretariat under the Government of India.)*

Leaving Nowgong, agreeably to instructions, on the 3rd of December 1839, I proceeded to Dhoboka, which I reached on the 5th of the same month. The country to that point being well known, requires no further description.

I left Dhoboka on the 6th of December, at about 7 A.M., and arrived at Oopur Jumonah, at about 11 o'clock. First crossing the Jumonah river about half a mile above the Dhoboka village, we entered Tularam Senaputtee's boundary line. The route lay through a forest, called Rungaghora, from whence most of the villages on the banks of the Jumonah procure their fuel. There has been an attempt at a clearance in the forest, but much difficulty is experienced by the Ryots, from the great number of wild animals which infest this part of the country; viz. elephants, tigers, rhinoceroses, buffaloes, and hogs. The path the whole way is tolerably good. Oopur Jumonah is a hamlet of about twenty or thirty houses, scattered along the banks of the Jumonah river; it is fast decreasing in number, in consequence of the people having suffered much from the destruction of their crops by the wild animals in the neighbourhood.

7th December.—Marching at about 7 A.M., I reached the Cacharee village of Nermolea, the distance being about ten miles. One hour's

marching brought us to the Ha,our Ghaut, which we crossed to the Cacharee village of the same name in the Nowgong district. The Jumonah river is navigable for small boats at all seasons of the year to this village. The crops between Ha,our and Nermolea had suffered much from the high rise of the river Jumonah, which overflows its banks nearly the whole length of its course.

8*th*.—Departing from Nermolea, and passing considerable cotton tracts, we reached the village of Bokolea, four miles distant, where I found some of the lime burnt by Mr. Martin for Government, in store. The country along the banks of the river between this village and Ramsa (a small village six miles west of Mohong) is uninhabited, and is composed of large grass wastes with patches of forest at intervals ; the greater part of the low lands below the falls of the river, are liable to inundation. Passing through Bokolea, we continued on till we came to the huts erected for us, on the Tutra river, a small stream, which issues from the Mikeer Hills. To this point most of the Kyahs and other traders trafficing in cotton come in the cold season ; there is high ground about it for a Haut (or fair), and there is a Mikeer village two miles inland. A short way above is the Oogeroo Chokey, established by Tularam, who exacts a toll from all his Ryots who frequent the Tutra mart.

9*th*.—Leaving the Tutra encampment, and passing through forest and grass jungle, we came to some low, undulating, grassy hills, from whence a tolerable view of the surrounding country is obtained, which became more overspread with hills, chequered by the ancient cotton cultivations of the Mikeers. These migratory agriculturists seldom remain longer than two years in one locality, and only very fine land induces them to determine on a three years' residence; by which time a deep rooted grass springs up, which drives them to fell more forest for their staple crop, not being able to use the ploughshare to eradicate the roots, on account of the nature of the ground. Passing over these hills, we gradually came on the rumbling of the cataracts, which increased, as we approached, into a stunning din; the river at this part is confined by low hills on both sides, and the quantity of water that rushes over the falls in the rainy season, must be very considerable; the height I was shown as that of the ordinary rise, cannot be less than 100 or 150 feet. Two paths lead over the hills on either side, and all

cotton boats are obliged to be unladen at this point, and a change of boats takes place. Above the fall, on the right bank of the river, is a stratum of chalk. Proceeding by the path on the right side of the river, we came to a small rivulet at the base of the hill, in the bed of which, I was shown the stratum of coal that had been excavated. I was informed by Lieut. Brodie that it lay to the right of the path, and was comprised in a space of about fifteen or twenty feet long, up to the junction of the streamlet with the river Jumonah. The water is about two or three inches deep, and the coal bed is visible six or eight inches above the surface of the water; the superficial part of the seam is composed of a soft black substance, which on being cut away produced shale, or black slate, and further excavations showed servicable coal. Above the coal formation lies a thin stratum of red sandstone ; above this is a greyish soil, two feet deep, the surface of which produces the forest and underwood usually found in the vicinity of hills in Assam. The bed of the rivulet is about six or seven feet broad, by four or five deep; on either side of the coal-bed I found chalk. The only difficulty in working this seam would be the rise of the streamlet in the rains, and the expense that it would take to carry the coals to below the falls. The former difficulty might however be removed by leaving a wall of the coal itself, and opening the vein a few yards inland. A short way further on are two more rivulets, in both of which I found chalk rocks; one description contained small globular, dark grey substances, resembling decayed pebbles. The distance from this locality to Ramsa is about one mile. The rock from which the lime was cut for Government, is situated in a small river below the falls called Mayong Deesa, in Tularam Senaputtee's country. The coal found by Ram Doss Mohurer is a short way from Ramsa (half an hour's march) in a N.W. direction; it is in a small streamlet called Bongrong, which is almost dry in the cold weather.

10*th*.—Left Ramsa, and marched through fine open forest; three miles distant crossed the Jumonah into Tularam's country ; one mile further on recrossed it, and in half a mile reached Mohong.

11*th*.—The Nagas of the village of Gafaga came in, and gave me the following account of themselves:—They formerly belonged to the tribe of Nagas called by them *Chokannew*, and by the Cacharees *Dewansa*, living

south of the Sumoogoding range, and on account of the frequent quarrels and oppression they had been subjected to from their own tribe, they had been obliged to emigrate : they first took possession of the high hills on which the present village of Tokophe is situated, but even there, not being free from the attacks of their persecutors, they again fled to the lower hills upon which they are now. The following is the information I have been able to pick up regarding the wild tribes here about. The villagers of Gafaga, Mezattee, Badolasong, Kola, Muzals, Tooroofen and Gesinga, are all of one tribe, and have separated into a number of villages in consequence of quarrels amongst themselves; not acknowledging any regular chiefs, and every man being his own master, his passions and inclinations are ruled by his share of brute force, his dexterity with the spear, to which arm they have immediate resort for the adjustment of the slightest quarrel, and in consequence, villages are continually at feud. In addition to this, the Tokophen Nagas, who are of a different tribe, and speak another dialect, in league with the Nagas about the Sumoogoding range, pay them occasional maurauding visits, and take advantage of their flight on their appearing, to pillage their villages. The Nagas of the village of Gesinga, or as it is called by some Rengma, are at feud with those Nagas on the eastern bank of the Dhunsiri, in the Jorhat division, called by the Assamese, Lotah. The former village is under charge of an half Assamese and half Naga, Gesinga Phokun, who exercises some rule over the village. The latter tribe, from the different accounts I have heard of them, appear to be of a more civilized character than the Nagas on the west bank of the Dhunsiri, having regular chiefs, whose orders they regard, and trading largely with the Assamese at Cacharee haut. The Tokophen Nagas came in, and declared that they had no evil inclinations towards the Majuttee and Gafaga Nagas, but that they had heard that the Dewansas intended making an excursion against them at the full of the moon. I gave them clearly to understand, that if they persisted in their present mode of life, and would not leave off their maurauding habits, they would be punished severely, and not allowed to remain in their present locality; and nothing more of the intended excursion was heard. It is a common practice with Nagas, when they are going to make an excursion against a village, to set reports afloat that other villages or tribes intend an excursion against the same village,

which blinds the villagers of the place attacked as to who the real assailants are, as their excursions are generally performed at night. The Nagas here about procure their brass ornaments from the village of Gesinga, and their spears and daws from the Dewansa or Chokannew Nagas. Their villages are of inconsiderable size, and they have but few domestic animals; some cows of the hill breed, pigs, and fowls, for the purpose of sacrificing to their gods.

They acknowledge the power of three gods, viz.

1*st.* Zanghuthee, or Janthee, the most powerful, to whom they sacrifice cows, bullocks, or bulls. His power prevails in all serious illnesses, and can kill or cure.

2*nd.* Hyeong, to whom they sacrifice fowls only, his power is of slighter extent.

3*rd.* Dherengana, to whom they offer hogs.

The two latter are the tutelar gods of the village of Gafaga, each village having different ones; some of them think it necessary to sacrifice at one time, for any great worship, a cow, or bullock, a hog, and a chicken a few hours old; the former are eaten, but the latter is thrown away. Zanghuthee is acknowledged by all of them. Goats are not allowed as offerings. The physiognomy of the Nagas about here partakes a good deal of that of the Cacharee, in consequence of the admixture of the two tribes. I saw some Assamese who had been kidnapped when young, and who had become so accustomed to the idle, uncouth life of the Nagas, that they refused to leave them.

Matrimony amongst these Nagas is a civil contract, unattended by any religious ceremonies. The damsel is courted, and is presented with fowls, dogs, and spirits, according to the fortune of the lover, and after her consent and that of her parents (for they have the right of refusing) is obtained, the accepted lover gives a feast to all her relatives. A day being appointed for the union to take place, the whole of the villagers are feasted; they in return are obliged to present the new married couple with a new house in the village. Any breach of marriage vows is punished by a fine of a cow or hog, by the counsel assembled for trial of the culprits. One of the most singular customs is, that after the birth of the first child, the parents and relatives of the new married couple are prohibited from touching any other villagers, or any other villagers from touching them, for two or three days; should a villager

infringe the rule, he is obliged to remain two or three days in the house of the parents and not to mix in society; but if the relatives of the party are in fault, they are punished by a fine of a feast.

On the occurrence of a death, they howl their lamentations, feast, and bury the corpse, placing the deceased's spear in the grave, and his shield, and a few small sticks like forks, with some eggs and gram, on the grave, as an offering to ensure them good crops. I could get no reasons from them why their doing so would ensure them fertility of the soil.

They are not very martial at present, having been generally the party attacked and subdued by the other Nagas. They have very little trade, and not much inclination that way, being too fond of idleness to exert themselves for their own improvement; they cultivate small quantities of cotton, and exchange it for salt. Many of them have taken refuge in the Mikeer villages, and may in time adopt the industrious habits of those cultivators, but their unruly, independent inclinations would be a great obstacle to any attempt at improving them. Mohong Dejira now consists of about 50 or 60 houses; in former days it enumerated about 300. The emigrants have formed the villages of Bokolea and Nerondlea, and many are gone to Dhurumpore. The cause of their flight, it is stated, was owing to some Nagas a few years ago having killed two of their tribe; that may be partly the reason, but the itinerant character of the Cacharee, may have influenced them greatly. The Cacharees here, till within two years past, have been obliged to pay tribute to the Nagas of Sumoogoding, to preserve peace. The tribute consisted of a cow or bullock, and one maund of salt per annum.

The lands about here are of the finest description, some yielding very rich crops of grain, and can be irrigated at pleasure by a small rivulet which issues from the hills to the N., but the indolent disposition of the villagers (who are an admixture of Assamese and Cacharees) prevents their taking advantage of the fertility of the soil, large sheets of which remain uncultivated, which were formerly well cropped; but since the reduction of the village, and their union with the Assamese they have become great opium-eaters, and merely cultivate sufficient rice, &c. to afford them the means of subsistence. Some traders extend their traffic up to this village, and procure a tolerable supply of cotton from the Dhejuah Cacharees. There are few Indian products that could not be reared on the low lands around this part of the country, and the presence

of lime, coal, and chalk about the vales, might prove of the utmost use to any manufacture or plantation which might be established, as the country becomes known and settled. Regarding the climate, I cannot say much from experience; but the diseases both amongst cattle and men, which have proved so fatal to those attacked by them in the northern parts of the Nowgong division, have not been known here, and this may allow one to conclude, that this part of the country is more salubrious than other parts.

No grain having arrived till the 13th, I was unable to move forward; when thirteen maunds having accumulated, I proceeded with half of the Shan Detachment (leaving the remainder to follow when more grain came up, as I expected its arrival every moment) to Dhemapore Nugger to which place I had requested Tularam Rajah to cut a road, having heard of the existence of the ruins of an old Cacharee fort on the Dhunsiri on my return last year, which nobody (with exception perhaps of one or two very old Cacharees belonging to Tularam) had seen. Crossing the Jumonah a mile or two distant from Mohong, we reached the Dhealow river, on which sheds had been erected for us, and were obliged to encamp, as I was told the second sheds were too far for us to reach that day, having started late, from the non-arrival of the coolies. The Dhealow is about ten or fifteen yards broad, and like most hill streams, shallow. The path was excellent, over a slightly undulating country; we passed a few clearances which had been deserted several years back, on account of the Naga feuds; the distance to this is about six miles; the appearance of the country wavy, with small rich alluvial plains at intervals.

14*th*.—Passed through the same description of country as yesterday, and was obliged to encamp at the second sheds, eight miles distant, on the Pikrong Deesa, the distance including our present march from this to Dhemapore, being too great for the coolies.

15*th*.—Passing over a small plain and some wavy ground, we found the path excellent till we reached the Looree, a small river, in the bed of which our route lay for three or four miles to within a league of Dhemapore; when we left it, and got upon some high country, which led us to the fine bund road skirting the walls of the ancient city. I was very much astonished to find so fine an old place, totally lost sight of by the Cacharees themselves, an oral tradition of which was merely in existence; but they attribute it to the fear they have always felt

of going into these forests, which since the desertion of the place, have been overrun by wild beasts, and frequented only by plundering Nagas.

The remains of Dhemapore Nugger consist of some pillars of various patterns, a gateway, the ruined tower, or palace wall, and a small fort to the north, besides tanks both within and without the walls. The fortification is surrounded on three sides by a dry ditch, of about thirty feet broad, a bund, or camp, and a second ditch. The gateway is in a tolerable state of preservation, but the inner passage, or guard room, has given way, and lies a heap of ruins, on which the Nagaser and other trees grow. The pillars are in three parallel rows, two of which are of a circular form, and one square; there are ten in each row of the former, and twenty in the single row of the latter; many of them have been split asunder by trees falling on them, and shrubs growing from out of them; in one spot a large banian tree has entwined its roots over a fallen one; some of them have been worn smooth by the wild animals (elephants, rhinoceroses, hogs, &c.) rubbing themselves against them. One of the pillars appears as if it had been an instrument for the punishment of criminals. It resembles two long square pillars joined at the base, and gradually increasing in distance from each other, from two inches at the bottom, to several feet at the top. The form of the town, or palace enclosure, is an oblong square, lengthways facing the river, which is about 200 yards off. It was built by Chokradoz, 4th Rajah of Cachar,* but long subsequent to the erec-

*RAJAHS OF CACHAR.

1 Oodi Bhim; the founder of the House;
his son,
2 Kartrick Chundro;
his son,
3 Beerdurpo;
his son,
4 Chokradoz;
his son,
5 Manik Chundro;
his son,
6 Phalgoo Durpo;
his son,
7 Hurrick Chundro;
his son,
8 Narionee Chundro;
his son,
9 Madub Chundro:
his son,

tion of Ghergong in the Jorhat district, the first residence of the Cachar Rajahs. It is stated that after being driven from Ghergong by the

10 Oodok Narion;
his son,
11 Indra Bol;
his son,
12 Moyurut Doz: his brother, { Nychinggra, his son, Krete Chundro,
his son,
13 Gooroorod Doz;
his brother,
14 Ordoa Detee;
his brother,
15 Mokorod Doz;
his brother,
16 Tamruz Doz;
his son,
17 Sooroo Durpo;
End of regular line
18 Krete Chundro;
his son,
19 Ram Chundro; { Hurree Chundro being an infant at the death of his father, Ram Chundro, his uncle, assumed the royal power.
his brother,
20 Lukee Chundro;
his nephew,
21 Huree Chundro;
his son,
22 Kishen Chundro;
his brother,
23 Goovin Chundra, murdered in 1830.

Tularam claims descent from Soroodurpo, the 17th Raja of Cachar, thus

Soroodurpo—his brother—Ghumber Sing.

Hada, Dow,

Racha Dow, Moodooram, Anundro Ram,

Kishen Churun, Doorga Ram, Seeb Ram, Govin Ram,

Tula Ram, Joy Ram,

Runget Ram,

Nohal Ram, Bundoo Ram,

NOTE.—Lieut. Grange does not inform us whence he derives his list of the Cachar Rajas. His description of their ancient abode will not fail to interest the readers of the Journal. It is curious to note this instance of singular change in the political and social condition of the Naga country, in connection with the discoveries lately made of the former existence of civilization in tracts now among the wildest in India. It is only thus that the difficulties which beset the antiquary and the historian in this country, can be appreciated. The materials are now in course of slow accumulation, which will assist some future Gibbon in giving such a history of India, as must, I fear, remain for years a desideratum in literature.

Assamese, Chokradoz settled on the Dhunsiri river, and built Dhemapore, but hearing of the approach of a famous Hindoostanee warrior, called Kala Par, who had been converted from the Brahmin caste to the Mahomedan faith, and had become a great destroyer of Hindoo images, he fled with the image of the tutelar god of the house of Cachar to Myhong, in the hills, where he built a fort. Kala Par not finding his foe, pillaged the place, and withdrew to his country. On his retirement the Ahoms,* or Assamese, came to take possession of Dhemapore, but Chokrodaz not fearing his new enemy came down from his retreat in the hills, and meeting an Ahom Phokun, inquired of him the reason of the Ahomean invasion, to which the Phokun replied, that they had merely come to look at the country, and that the army had withdrawn, which answer satisfied the Raja; when however, in fancied security he and his people laid aside their arms and proceeded to encamp and cook, they were attacked by the Assamese who had been laying in ambush, and not being ready to receive their treacherous foe, were put to immediate flight. The Rajah, with the remainder of his men, succeeded in effecting his escape to Myhong, where he remained, and Dhemapore was deserted. He died at Myhong, as did several of his successors, and the court was afterwards removed to Kaspore in the plains. The country round Dhemapore has all the appearance of having been at a prior period well populated. On the right bank of the river are three large tanks, two of which were excavated by the Rajah and Ranee; they are twenty cubits deep, and with the exception of a break in one or two places in their banks, are quite perfect, and hardly a weed is to be seen on their surfaces; they abound with fish. The banks are heavily wooded, and I found several kinds of citron growing on them. The wild elephants and rhinoceroses had taken up their abode upon them, and use the tanks as their baths. The whole country in the vicinity is covered with forest, containing very fine timber of the following descriptions—Cham,[1] Tetachapa,[2] Ghunsiri,[3] Rata,[3] Toon,[4] Awal,[6] Hullok,[6] and Nagaser.[7] I am informed by Tularam

* Rather the conquerors of the Assamese (vide Asiatic Society's Journal No. 104) these warriors devastated Assam simultaneously with the Musselmans.

1 Artocarpus Chaplasha? 2 Laurus? 3 Laurus Sassafras? 4 Cedrela Toona. 7 Mesua ferrea.

No. 3 is I believe a species of Camphora.—[N. W.]

and others, that the Nagas west of the Doyang river derive their origin from an union of the Cacharee and Naga tribes, and that in former days the Nagas were far away beyond the Doyang river. The Nagas themselves acknowledge an origin from the Cacharee tribe, and on that account they used not to decapitate the Cacharee prisoners they made, to obtain ransom (?) which they invariably did with the Nagas that fell into their hands. Their unusual custom of not acknowledging any regular chief amongst themselves, tends greatly to confirm that statement, as the Lotah, Nimsang, and other Nagas on the east of the Doyang river, I am informed, have regular chiefs, besides a chief over a number of villages. The scantiness of the present Cacharee population may therefore be accounted for by their having been partly absorbed in the surrounding tribes, and their emigrations to all parts of Assam.

The Cacharees attribute the desolation of their country to (what they call) their innocence and simplicity of character, and the superior cunning of the Ahoms, of whose magic powers they have many traditional stories; certain it is, that Dhemapore must have been the seat of a considerable population in former days.

The appearance of the lands about, are of the richest description, and they have been much extolled by all persons who have seen them. The country is high, and not liable to be inundated by any rise of the river, with undulations and small hillocks at different places; there are a few marshes and low lands on the banks of the river, which are very rich, and well adapted to low land crops; but the products most likely to be suited to the higher growers, are tea, coffee, sugar, tobacco, cotton, wheat, &c., and all kinds of vegetables. There are a great number of animals of all descriptions about Dhemapore, and those that came under my observation, were the elephant, rhinoceros, tiger, buffalo, hog, and deer; there is also a great number of birds of many varieties of plumage, and several kinds of lizards.

There is a Mora Dhunsiri a short way to the south-east, along which we discovered by the cut twigs a wild animal's track, used by the Nagas, leading from Sumboogoding towards Tokophen, by which it is evident that they have hitherto been in the habit of communicating with that village, and no doubt have been one of the parties engaged in annoying the Rengma Nagas. The latter complain both of the

Lotahs and Dewansas, but more particularly of the former, whom they call Chokannew, and the latter Choquennew. The Dhunsiri river contains gold of a dark colour. I succeeded in procuring a few grains, through means of a gold-washer I took up with me, but the quantity procured held out but little inducement for him to continue washing on his own account. The depth of the river was not sufficient in the cold season to admit of canoes reaching Dhemapore, though no doubt they can do so at other seasons of the year. The breadth of the river within its banks up there is 160 feet. There are many deep holes in different parts of it, which contain many descriptions of very fine fish, and the Cacharees kill great numbers of them with a poisoning creeper they call "*Deo Bih*," which they bruise and wash in the waters.

Having received intimation that no grain had arrived at Mohong since my leaving it, and the quantity I had brought on with me not being sufficient to authorize my moving forward (only a day's grain being in camp), I returned to Mohong to urge on the large quantity which had been despatched from Raha in November, but which from unforeseen difficulties had been detained at Sil Dhurmpore. I reached Mohong in two days, and returned to Dhemapore on the 17th, and grain arriving on the 19th, I was enabled to start from Dhemapore on the 21st, but not having a sufficient number of coolies to take the whole of the party on, I was obliged to leave the Assam Militia which had arrived from Jorhat behind, to follow me up when I sent back the coolies for them. The distance from Dhemapore to Sumoogoding I should say, in a straight line, would be about fifteen miles, but by the route I followed, not less than twenty-two or twenty-four miles, which I accomplished in 2½ days.

Having built a stockade independent of the villagers, and part of the Jorhat Militia having arrived under their Subadar, I left them in post here to guard any grain that might come up, and quitting Sumoogoding on the 2nd February, reached Razapamah or Jykamee that day, the distance being but six miles. We did not pursue the route followed by Captains Jenkins and Pemberton, but descended to the southern foot of the Sumoogoding ridge, and went along the stony bed of the Desem Unurue, or Kooki river, till we reached the eastern base of the low ridge on which Razapamah or Jykamee is situated. As we reached the village which stood about a quarter of a mile from the river Keruhee, an influen-

tial chief came down with all his war accoutrements on ; upon my inquiring the reason of his being thus equipped, he said, had we intended any harm, they would have fought us. They had piled up stones on their small circular towers, by the path side, to throw at us as we advanced, which proves how ignorant they still are, some of them, of the effects of fire-arms. He offered me his house, and several houses of his party for the night. He informed me that the village was divided into two parties, and that he could answer for the peaceful intentions of his own party, but not for the other. He said he had suffered much since I had last seen him, having quarrelled, fought, and found his match in a fellow villager, who had burnt his house and grain, and made him almost a beggar. In the evening, over a brisk fire, I succeeded in obtaining some of their martial ideas ; bringing his shield, which was covered over with the hair of the foes he had killed, and carefully unwrapping a cloth off two pieces of ratan covered with the hair of his sisters, he placed them on each side of his shield, and commenced springing about with very great agility, spinning his spear round all the time. He then showed me, with an air of very great pride, the two ratans covered with hair, and said that they could only be worn by warriors who had killed many of their enemies, and brought in their heads, who are then entitled to receive some locks of hair from each sister, tied on ratan, which they are obliged to wear on their shield, in the manner above described. They consider certain Nagas their natural enemy, over whom gaining any advantage would be great honor. On my inquiring who his enemies were, he very innocently replied, the Beren Nagas, and those about Simkir ; his feud with the Beren Nagas having arisen from a quarrel he had had with some of the Nagas of that village, at the salt wells near Sumoogoding. On my telling him that I had come up on purpose to suppress the aggressions committed in that quarter, he replied that he was aware of it, and had not been out since I was last up on their hills, and that he had assisted the Dâk wâl, who had foolishly gone up after me. The latter case was true, but whether the former was, or not, was impossible to say ; though as no aggressions from this quarter have been heard of this year, it is probably true. Leaving Jykamee on the 3rd, we followed the route by which Captains Jenkins and Pemberton came, for a short way, and then turning to the left, entered the villagers' cultivations, on which we found the tea tree growing in the

most luxuriant manner, uncared for, and unknown; in the rice fields it springs up in all directions in fine bushes, from the roots of old trees which had been cut down by the Nagas in clearing their lands for cultivation; the leaves of the plants found in the rice fields were much broader, and of a deeper green colour (some leaves tinged with yellow) than those obtained in the forest. It grows in many places on the low hills in this neighbourhood, and appears a very hardy tree. The greatest size which the trees I saw attained, were from two or three inches in diameter and fifteen or fifty feet high; the jungle causing them to run up this way to get at the air and light. The country it is found in, is very like that about the environs of the falls of the Jumonah, where there is but little doubt that tea would grow equally as well as it does on the Naga hills. I am informed by a Burmese who was formerly on the frontiers of China, that in the districts of Taongbine and Taongmah, the Polong inhabitants cultivate nothing else but the tea tree, and that from one description alone four varieties of tea are obtained, which he described in the following manner—First kind, from the buds, called in Burmese *Shuabee.* Second kind, when two leaves only have shot forth, called *Kugengoo.* Third kind, when five and four leaves have shot forth, called *Kugeyenka.* And the fourth kind when in five and six leaves, called *Kyeot.* The latter is drank only by the common people. In appearance it is exactly the same as that found about Jykamee. The hills on which the Polong people live, are much higher than those we discovered the tea on in the Naga hills.

Passing over these low hills, we came to a small plain, on which we found ginger growing wild. It was quickly dug up by the Shans for medicinal purposes, who said it was to be found growing in the same state, only in the Singhpo country. Crossing several feeders of the Desem or Unurue river, we ascended to the village called by the Munipoorees, Ookusuha, and by the Nagas about this part, Terriamah, or by the Nagas on the Cachar hills, Umponglo. The villagers, as they did last time I passed their village, offerred us no opposition, but showed us a place to encamp upon, and assisted to clear away the jungle for that purpose, for which I gave them presents. There is no good ground near the village for encamping on, but before ascending to it there is a small stream on which Captains Pemberton and Jenkins formed their camp, which is a good place for halting at coming

from Jykamee, and prior to crossing the great range. There is also another spot beyond the ridge Terriamah is situated on, which is immediately beneath the great range on the Desem or Unurue river.

4*th. February.* Ascended the great range by the path followed by Captains Jenkins and Pemberton. The ascent was extremely steep and harassing to the coolies, and we did not reach the small river beneath the Haplongmee, till 3. P. M. Haplongmee is called by the Nagas about here Konomah, which is equivalent to the Sinpalo of the Nagas about Beren, and the Cachar hills.

5*th.* We started from Haplongmee in search of the Muniporee detachment, which was to have met us there, and encamped on the Tobool or Tzupfoo river, in the fence erected by the Munipoorees on their return route; but my party only taking up one quarter of the ground they did, I was obliged to make the fences much smaller. I calculated the force of the Munipooree detachment at 400 men, judging from the extent of ground it covered. The Nagas after promising to show us the route to the place where we might find the Munipoorees, or at any rate to the next village, began to slip off one by one, after we had moved a short way from their village.

6*th.* Passing a short way up the bed of the Toobool, or Tzupfoo river, we turned to the right, and ascended a slight ridge. The country about this is extremely rugged and repulsive in appearance, being composed chiefly of high rocky ranges, with but little flat ground at their bases. The sides of the ridges are covered with low bushes, and small quantities of grass, and here and there a stunted fir or two. I saw some apple trees which had been planted by the Nagas; also, in the vale in which we encamped, willows growing along the ditches, as in parts of Europe. The climate I should say was good, it was moderately warm in the day, and cold at night, with sharp hoar frosts on the ranges. All the water in our mugs and pots was thickly frozen during the night we remained at this place.

7*th.* Not thinking that I should find the Munipoorees by advancing further, after the misrepresentations we had received, I turned to retrace my steps to Konomah or Hoplongmee, hoping to be able to make a detour and visit Ikare and Singpagee; and proceeded down to our former encamping ground on the Toobool, or Tzupfoo river. The fences and huts had been destroyed by the Hoplongmee Nagas, but we soon erected others.

8*th*. Advanced to the heights before entering Hoplongmee. I found some difficulty in procuring information regarding the customs of the Nagas of these parts, on account of their suspicious character, and fear of answering my questions, which they think might tend to discover some of the exceeding cunning habits which they possess. They are very fond of argument, and have recourse to it immediately they become aware that they are not able to cope with their enemy *viet armis*, and do not scruple to resort to the most absurd falsehoods to try and intimidate their opponents.

They are, like most mountaineers, very uncleanly, and their habitations are seldom or ever cleared of the filth of ages. The houses are large, and are generally divided into two apartments, in which they live and keep their grain, animals, &c. One family only resides in one house. When not obliged to work, the men are lazily inclined, and spend their mornings generally in sipping a species of fermented liquor, but when pushed to labour, they are very active, and work very cheerfully to some merry song. Their reaping song in particular struck me as being exceedingly wild and pretty. They form a line of men, women and children, and advance together, singing in chorus and cutting down the crop. They cultivate several kinds of vetches and peas, and have four or five species of rice, some grown on the mountains, and some in the vales. The latter are produced on lands that have been shaped out in steps and are irrigated by the innumerable streams, rivulets, &c. found at the base of nearly all the mountains.

They breed cows, pigs, goats, fowls, and dogs, and eat of nearly every living animal; in fact I do not know of a single exception, rats, snakes, monkeys, tigers, elephants, being all equally tasteful to them. I was informed that Konoma, or Hoplongmee, is composed of 300 houses, half of which are Angamee and half Dewan Nagas, but they unite and join in all pillaging expeditions with the two Angamee villages of Mozomah (Ikaree) and Khamona (Impagee), both of 500 houses strong. The three villages, to keep up their tie of alliance, are required to give a united feast once a year, each village sending a cow and other articles for the occasion. The villages at the northern base of the great range are an admixture of the Angamee and Dewan tribes. The Angamees are known to the Nagas by the name of *Khunomah*, and the tribe known by the Cacharee name of Dewansa, is called *Thungeemah;* a difference must be observed between the

names of Khunomah and Konomah, the latter being the name of the village of Hoplongmee, and the former of the Angamee tribe and of an Angamee village. I could not obtain any accounts of the origin of this singular tribe, who appear to have been a small colony established in the midst of a number of tribes, who, from their daring and martial character, have held all the surrounding tribes in awe, and after increasing itself into three or four villages, has completely gained a supremacy over its neighbour, and although the latter boasted of a much greater number of villages, though not so large as the Angamees, and a larger tribe, they are not able to attack them in return, from their want of unity and confidence. The attacks of all these wild tribes are looked upon in no other light than authorized martial exploits against their natural enemies, which singular to say, they consider all Nagas not of their own tribe. Now however that they are attacked by them in return, they are becoming less inclined to continue their former distant maurauding expeditions, and confine themselves merely to the revenge of any injury they may have, or fancy they have, received. The Dewan tribe, I imagine has obtained that name from having formerly either resided on, or come from beyond the Dooyang or Dewan river.

From the village of Yang, another tribe springs up, whose dialect is different from either the Angamee or Dewan Nagas, and who are called by the former tribe *Zamee*. Beyond the Doyang, other large tribes of Nagas exist; Lotah, Nemsang, &c. &c. these tribes I am informed differ from those to the west of that river, and are under their respective chiefs, whose authority they acknowledge, which is contrary to the system of the Thuggeemah (Dewan) and Angamees. The latter tribes when about to undertake any expedition, assemble the aged and fighting men of their villages to discuss the matter over, and the greatest bullies generally succeed in getting their wishes adopted.

The Nagas of these parts acknowledge the power of three gods. The first is known by the name of *Rapoo*, to whom they sacrifice cows and bulls only. He is the chief, and has the power of killing or curing. The second is called *Humaadee*, to whom they sacrifice dogs; and the third *Rampaow*, to whom they sacrifice cocks and offer liquor. They said, they had all three the power of killing or curing in different diseases. Their marriage ceremony is nearly the same as that of the Rengma Nagas.

Landed property is hereditary, and is cultivated for ages by the proprietors. In building houses, neighbours are required by custom to assist each other, for which they are feasted by the person whose house they are building. On deaths of fathers occurring, the property is divided, and all the family share, the house going to the eldest son, unless he has one of his own, when the mother retains it.

The barter value of different articles at the village of Hoplongmee was as follows, a cow is valued at 10 or 12 conch shells.

A pig	,,	,,	2 ditto.
A fowl	,,	,,	1 packet of salt.
A goat	,,	,,	2 conch shells.
A male slave	,,	,,	1 cow and 3 conch shells.
A female ditto.	,,	,,	3 ditto, and 4 and 5 ditto.

The children of slaves are slaves.

The climate of Hoplongmee is in the month of February very fine, the days are mild, and the nights very clear and cold, and a strong hoar frost rests on the ground till 8 A.M.—I found wild raspberries growing on the hills in the vicinity, and some nettles resembling those found in Europe. The hills are of considerable altitude, and those in the immediate neighbourhood of Hoplongmee covered with stunted grass, with wooded patches on their sides. The alpine scenery is extremely fine, and few sights could exceed the grandeur and fearful appearance of a storm rolling slowly through these mountain chains. We experienced some very high bleak winds on them.

The Nagas have several ways of prophesying the success of any expedition they are going on. One is by cutting a soft reed with their spear head into flat pieces, and if the slices fall to the ground one way, success is sure to fall in the opposite direction intended; according to the number fallen that way, so will be the proportion of ill luck; success by another mode is by the means of the flight of a cock. If he flies strong and far, it is a favourable sign; but if, on the contrary, he should fly weakly, and to no distance, ill luck is sure to ensue. In going on an expedition, if a deer cross their path they return, and defer their trip till some other day. This same superstition prevails also amongst the Shan tribes, with the slight difference, that if a deer cross their path from right to left, they proceed, but if in the opposite direction, i. e. from left to right, they return immediately, considering it a warning not to proceed upon any expedition.

Leaving about 9 A. M., we crossed the great range, and after a very fatiguing march, did not encamp on the Unurue or Desem river till dusk of evening; we this day reached a stream, three miles to the south of Jykamee, the distance from that village to the base of the great range being rather too far for the coolies.

15*th February*—Quitting at 6½ A. M. an hour's march brought us to Jykamee. We encamped this day on the Desem river, at the southern base of the Sumoogoding hill.

We discovered the tea tree growing in the neighbourhood of camp in a very luxuriant manner, the country is of the same description of low hills, as found in the vicinity of Jykamee.

19*th*. Marched round the village, to avoid going through it, as the Nagas seemed to have much objection to it, and met some Nagas from other villages.

20*th*. Leaving Pepamee, and proceeding for about a mile, we came to some trees, in which I halted the party; we encamped upon a small stream about four miles from Pepamee. In the evening we observed their beacons alight (on high hills) in all directions, which I found out were signals of our position, and movements; the number of beacons burning at the same time, being the signal of our advance, retirement, or halting place; the path was very good, over a ridge of low hills.

21*st*. Our progress was very slow, and although the distance to Juppmah was four or five miles, we did not arrive there till 3 P. M. We entered the village through a narrow lane, with a stone wall on either side, and a bamboo trellis work over it, and a single plank of considerable thickness as a door. This village was a very old one, of about 300 houses, although report always augmented the number to 500; it is composed of half Angamee and half Dewan Nagas. Some of their stools or bedsteads were very large, cut out of a single tree, and they held them in great esteem; their iron instruments being of the most inferior description, it must have taken them considerable time and labour to cut out the trees. We found a great quantity of rice in the jungle, of four or five different kinds.

The Rengma river winds past the western foot of the hill this village is situated on. On a hill on its right bank, bearing from Juppmah 55½, is the village of Bephomee. The country about this is composed of good sized mountains, though of much less altitude than those of the

great range, averaging from two to three thousand feet high. The Sumoogoding range, after admitting the Desem river through it to the east of that village, continues in a north-eastern direction till it is again broken by the Rengma river passing through it, and it finally ends at the Doyang river; the hills on the eastern bank of the latter river extending down its course to about the parallel of latitude of Mohong Dhejooa. The mountain on which Juppmah is situated, overlooks the Sumoogoding ridge, and the whole country is visible up to the Rengma Naga hills, to the west of the Dhunsiri; the eye extending over a vast dark looking forest plain, with the course of the Rengma winding through it, till it is lost sight of in the distance. The hills to the east, between the Rengma and Doyang river, are of a far less height than those to the west of the former river, and run in parallel ridges, east and west. The largest mountains lay in detached ridges to the south of the great range.

It appears to me that the latter range would form a well defined boundary between Assam and Munipoor, running in an almost uninterrupted straight line from the Meghpoor valley up to the Rengma river, a slight bend only taking place to the southward, of not much consequence, about Berem.

I regret extremely I was not able to prosecute my examination of the country further to the eastward, which I was obliged to give up on account of the delay that I had been subjected to in the plains, and the lateness of the season at which I entered the hills. Sickness had commenced in camp, which made marching very harassing with the limited means I had of conveyance.

27*th*. After much difficulty in providing conveyance for the sick, I left this ground, and returned by the path we had come.

We encamped in our former fences of the 20th.

On the 28*th*, reached Meyepamah; and on the 29*th*, arrived at Sumoogoding, and found that the whole of the stockade, grain, and property left behind, had been destroyed by fire, through the carelessness of a sepoy.

2*nd March*. Deeming it imprudent to trust a post at such a distance from any civilized population with only a few maunds of grain in a weak stockade, and fearing the ill will of the villagers, I brought the whole party down to Dhemapoor, where we found 200 maunds of grain assembled.

A short Memoir of Mechithar Ghosh, the Armenian Legislator. By Johannes Avdall, Esq., *M.A.S. &c.*

Armenia, that favoured portion of the globe, famed in the page of ancient and modern history both for its physical resources and political changes, is generally admitted to have been prolific in giving birth to men of vigorous minds, and no ordinary attainments, maugre the lamentable disasters consequent on the overthrow of the dynasties of its kings, and the invasion of the barbaric hordes, by which it was overrun in the various periods of its history.

The subject of this memoir, Mechithar Ghosh, was born in the Armenian era 592, corresponding with *Anno Domini* 1143, in the city of Ganzak, once the capital of Armenia Major, situated between the sea or lake of Gelam and the river Kúr, or Cyrus. While in his teens, he devoted himself to the study of the Armenian language and classical literature, under the able and paternal tuition of the learned friar Johannes of Tavúsh. His heart burned with a love of knowledge, and his whole attention was literally absorbed in the acquisition of the learning of his country. The death of his preceptor, which imbued his mind with a tinge of melancholy, and subjected him to a temporary dejection of spirits, was not allowed to cool his ardour in the pursuit of his favourite study. From an association with learned men of all ages and all grades, he derived an exhaustless fund of knowledge, and was thus enabled to enrich his mind with the gems of science and literature. Not content with the intellectual riches of which he was already possessed, he repaired towards the frontier of the Black mountain,(1) then the acknowledged centre of all Haican(2) learning and science, and the reputed resort of all men of letters and genius, with the view of extending his mental acquirements, and attaining to the highest possible eminence amongst his contemporaneous literati of Armenia. Here he was received with the greatest kindness, and the most marked attention, by his kindred spirits; and ultimately had the gratification to see his laudable endeavours crowned with the most triumphant success. He had the merit

(1) Սեաւ Լեառն in Armenian.

(2) Haic Հայկ was the grand progenitor of the Armenians, who are also called *Haics* Հայք, after his name.

of ranking in the list of the most learned and erudite of his age, a consummation to which his whole ambition aspired ! The extent of his learning could only be equalled by the degree of austerity which he had imposed on the mode of his life. He was highly esteemed by all, for the urbanity of his manners, and rigidness of his moral discipline. After a stay of some years in the society of men eminent for their love and acquisition of wisdom, he went to the city of Carin,(3) (the modern *Erzerúm*) preparatory to returning to Ganzak, the land of his birth. No sooner had he commenced tasting the sweets of the company of his relatives and nearest friends, after a long separation, than he had the misfortune to feel the disasters from the inroads of the Scythians, by whom that part of the country was cruelly harassed and devastated. This induced him to quit his native soil, and to proceed to the province of Khachen, where resided Vákhthánk, the prince of Hatherka,(4) under whose protection he expected to enjoy comparative ease and freedom from the molestation of unbelievers. Here he meditated the propriety of devoting himself to a monastic life ; and having determined on this step, he bade adieu to his protector, and repaired to the province of Kain, where stood a convent, known by the appellation of Ketick.(5) He took shelter within the precincts of this monastery, and joined its inmates with a full acquiescence in the rules of the institution.

On the demolition of that convent by the incursions of enemies, he constructed a new one on the spot, called the "Valley of Tanzút."(6) He also built in this place a church, consecrated by the name of St. Gregory the Illuminator,(7) and a small chapel dedicated to St. John the Baptist.(8) Subsequently, on the increase of the population in that place, he erected another church of solid stone, and on a more extensive scale, which was consecrated by the name of the holy Deiparous. The erection of this sacred edifice was finished in

(3) Կարին Carin is the name of the city of Erzerúm, in the classical atlas of Armenia.

(4) Վ. ախտանկ՝ իշխանն Հաթերքոյ in Armenian.

(5) Գետիկ or Գետկայ վանք in Armenian.

(6) Tanz Տանձ signifies *pear* in Armenian. The valley abounded in pears, and was therefore called Տանձուտ Tanzut, or *full of pears.*

(7) Սուրբ Գրիգոր Լուսաւորիչ St. Gregory the Illuminator flourished in the third century, and evangelised Armenia.

(8) Սուրբ Յովհաննէս Մկրտիչ in Armenian.

the year 1191. The convent, newly constructed by him, received the name of Ketick,(9) which appellation was afterwards applied to him, in commemoration of his being the founder of that monastery. He was also known by the cognomen Ghosh,(10) which appellative was added to his Christian name, in consequence of his having very little, or no beard; this circumstance is corroborated by the testimony of his cotemporary and countryman, Kirakus(11) Ganzakensis, who had the honour and pleasure of his personal acquaintance and friendship.

Mechithar Ghosh is known to have been the author of numerous works of sterling merit. He wrote a book on human nature, in the shape of an address from Adam to his sons, and from Eve to her daughters. He also wrote several treatises on the Christian faith, and on the Communion of the Altar. His pastoral and admonitory epistles are also extant, and afford a proof of his unassuming piety and philanthrophy. At the end of this epistolary work he says, "If I have ever erred in addressing these monitory letters to my countrymen, or unintentionally offended those whom I intended to benefit, I am most cordially penitent for my error, and readily ask their indulgence and forgiveness." He is also said to have written a commentary on the book of Jeremiah, and a great many sacred odes and poetical pieces. Some of the latter have been handed down to us, and are pronounced to be sufficiently elegant and sublime, to stamp him as a poet of no ordinary kind. His composition of "Choice Fables," is a combination of the *utile dulci*, and indicates his capacity to unite a great deal of instruction with much amusement. Of all the works of Mechithar Ghosh, the latter is the only one that has ever been printed. It was published by the Mechitharistic(12) Society of Venice, on the 18th of January 1790. The chief recommendation of these Fables is, their originality, for which they are considered to be far

(9) The subject of this memoir was also called Մխիթար Գետկայ Mechithar of Ketick.

(10) Ghosh Գօշ in Armenian signifies Քարձ or Քարց, vulgo Քօսակ, and in English, *beardless*, or *one having very little beard.*

(11) Կիրակոս Գանձակեցի in Armenian. Kirakus is from the Greek word Κυριαχὸς, and its adoption as a proper name, is very common among the Armenians.

(12) This Society was founded by Mechithar of Sebastia, in the early part of the eighteenth century. Its members have been pre-eminently successful in promoting the revival of Armenian literature, and the publication of numerous works of considerable merit.

superior to the "Select Fables of Vartan," published at Paris in the year 1825, with a French translation, by that most indefatigable and highly distinguished orientalist, M. J. St. Martin, under the auspices of the Asiatic Society of that place.

But the crowning literary production of this great Leviathan of Armenian literature, is the Code of Laws which he concocted, framed, and promulgated, in the year 1184, and which has immortalised his name as a legislator and first-rate author, in the recollection of posterity. In the preparation of this law-book, he availed himself of the assistance of Frater Josephus and Frater Paulus, both equally distinguished in the page of our national history, for their literary attainments and deep research. The laws comprised in this Herculean work are both civil and ecclesiastical, and admirably adapted to the state of the Armenians of those days. Mechithar Ghosh shines more conspicuously in the character of a legislator than in that of a divine, a disciplinarian, an annotator, a poet, or a fabulist. I have treated, at great length of the code of this eminent legislator, in my "Essay on the Laws and Law-Books of the Armenians,"([13]) and furnished some specimens of the laws contained therein. I must here repeat, what I have already stated elsewhere, my deep regret at the total absence of a printed Armenian standard Code of Laws, to the great inconvenience and difficulty of the Armenians located within the pale of the Honorable Company's courts in this country. Authentic and genuine copies([14]) of the law-book of Mechithar Ghosh, are to be found in the extensive library of the Mechitharistic Society of Venice. Want of funds to meet the expenses of printing, if I am correctly informed, is the only cause of the non-publication of this valuable work of antiquity; which, if published, would unquestionably be considered one of paramount interest and utility to the Armenian nation in general, and to the Armenian colonists of Bengal in particular. If the Armenians living under the jurisdiction of the Zillah courts of this country, be really willing to promote the security of the property of their children, let them step forward with

([13]) Which will shortly be published.

([14]) Since writing the above, I have been credibly informed that correct and elegantly written copies of this book are also kept in the library of Etchmiatchin. It is to be hoped that the work in question will speedily be published, either at Venice or Etchmiatchin.

their purses unstrung, and, with a spirit of true patriotism, bestow this posthumous work of their renowned legislator of the twelfth century, as an invaluable boon on their expatriated countrymen of British India.

But to return to the immediate subject of this brief memoir. In almost all national meetings, and in all synodical proceedings, Mechithar Ghosh took a willing and active part. He was present in the grand council, convened in 1178, at Hiromclah,(15) having for its object the formation of a union between the Armenian and Greek churches. His presence was also considered to be indispensably necessary in the two synods, respectively assembled at Lori and Ani, in the province of Shirak, between the years 1205 and 1207, for the express purpose of reconciling differences and dissensions, provoked by uneasy and turbulent spirits. He was desired by a particular invitation, bearing the signatures of the principal ecclesiastical dignitaries, to favour them with his attendance. He attended the council of Lori, but sent an apology for his inability to be present in the synod of Ani. Advanced age, aggravated by bodily infirmities, was the unavoidable cause of his absence from that assembly. He sent, however, his vote in writing, expressive of his acquiescence in the proceedings of the majority of the meeting. Not quite contented with this, and unsuccessful in bringing the affairs of the meeting to a satisfactory termination, the assembled Bishops persuaded Mechithar Ghosh, by repeating their solicitations in writing, to honour the assembly with his presence. The meeting stood adjourned, waiting his arrival with no small degree of anxiety. "Hasten," said they in their letter, "to our succour, for we are sadly divided; and the division cannot be healed but by a sweet word from your lips. Your apology for your advanced age and bodily infirmities, is inadmissible. Should you be visited by death on your journey hither, we shall hold your memory in reverence by a suitable and lasting monument, worthy of the public virtues of the best of our divines. Only hasten to our succour!" Mechithar Ghosh complied with their wishes, however fatiguing and wearisome the journey to a valetudinarian of his age and description. His presence at the assem-

(15) Հռոմկլայ in Armenian. The etymological signification of Hiromclah is the *castle of Rome*. It was an impregnable fortress in the twelfth century, and belonged to the Count of Jocelyn during the days of the Crusaders.

bly had an electric effect. A short address from him, judiciously and temperately worded, calmed and soothed the assembled multitude. The differences and dissensions were buried in the waters of Lethe; peace and unanimity restored; and the assembly dispersed to the satisfaction of all parties.

Such a wonderful character was Mechithar Ghosh; and so universally esteemed, admired, honoured and respected by his countrymen, for his public and private virtues. The qualities of his mind kept pace with the qualities of his heart. He attained to a good patriarchal age, and terminated his earthly career, *Anno Domini* 1213, and his remains were interred in the convent of Ketick, with every demonstration of honour and affection becoming the memory of so great and useful a man.

He had a great number of pupils, several of whom survived him, and rendered themselves distinguished by their literary productions, and acts of public utility. I cannot better conclude the memoir of this very learned and truly excellent man, than in the words of his countryman and contemporary, Kirakus Ganzakensis:—

Զսմանէ գրէ Կիրակոս. "Բազումք էին որք աշակերտեցան ի նմանէ "վարդապետական բանին, քանզի համբաւ իմաստութեան նորա հռչա- "կեցաւ ընդ ամենայն տեղիս, և գային առ նա յամենայն կողմանց. քան- "զի ըստ անուան իւրոյ մխիթարէր զամենեսին . . . . . բանք նորա ար- "դիւնականք և լի ընդհօք . . . վասն այսպիսի համբաւոյ բազումք որք "էին ի կարգի վարդապետ ծածկէին զինքեանս, և գային ի կարգի "աշակերտաց կալով. ուսանէին ի նմանէ, և առնուին վերստին հրամանս "Եւ բազումք յաշակերտաց նորա հասին ի պատիւ վարդապետական:"

"There were many who availed themselves of the benefit of his indoctrination. The fame of his learning had spread far and wide, and attracted pupils from all parts of the country. He comforted them all, pursuant to the literal meaning of his own name![16] His words and instruction were beneficial, and full of merit and grace! Owing to the celebrity of his name, many who had been invested with the degree of professorship, scrupled to acknowledge their own dignity, and went to him with the profession of pupilage on their lips. They were indoctrinated by him, and newly received order. Several of his pupils had the merit of being honored with the doctoral degree."

[16] Mechithar Մխիթար etymologically signifies *comforter, comforting, comfortable, comfort,* in the Armenian language.

Letter, forwarding a paper on the formation of the Museum of Economic Geology of India, from Captain TREMENHEERE, *Engineers, to* H. TORRENS, ESQ. *Secretary to the Asiatic Society.*

Calcutta, 27th January, 1841.

I have the honour to state for the information of the President and Members of the Asiatic Society, that the collection of specimens forming the basis of a Museum of Economic Geology, is placed in the room which the Society has been pleased to appropriate to that purpose.

I regret that my stay in Calcutta is so short that I shall be unable to complete the labelling of the specimens before my departure for Moulmein. The labels are, however, all prepared, and Mr. Piddington has kindly undertaken to place them near to each specimen, so as to render them distinctly legible. Corresponding printed numbers, which are also ready, are to be affixed to the specimens themselves, the numbers now attached being only of a temporary description.

To provide, as far as possible, for obtaining specimens of Indian mineral products, &c., and to explain the principles and objects of a Museum of this description, I have prepared a memorandum, in which I have endeavoured to describe the substances which it is considered desirable to collect, and the indications by which localities, which are likely to afford them may be traced in such a manner as to require little or no previous acquaintance with mineralogy or geology, to render contributions useful and illustrative.

A similar communication has been made to the Government of Bengal, with a view of increasing the collection of specimens suited to the objects proposed; and should your Society concur in the suggestions contained in the paper herewith enclosed, its communication to the corresponding members of your Society, may prove of service to the Museum of Economic Geology, now forming.

It is my intention, in compliance with a suggestion from Government to that effect, to maintain a correspondence, during my absence, with the Curator of your Museum, by which, and by personal communication, on any occasional visit which I may make to Calcutta, I shall be able to arrange for the disposal of specimens, which the Curator may receive, in furtherance of the views herein alluded to.

MEMORANDUM.

Numerous specimens of coal, and of ores of the useful metals, recently received by Government from the Court of Directors, have been placed, with the consent of the Asiatic Society, in one of the Society's rooms, at their house in Park Street, where they are arranged for public inspection. These specimens form part of a collection, to which it is intended that additions shall be made, until a complete series, exhibiting the mineral products of Great Britain shall be obtained; exemplifying at the same time, their modes of occurrence in rock formations, and the processes of converting the rough ores to the metallic state. With this view communications have been opened with the Director of the Geological Survey of England, for the supply and interchange of specimens suited to the objects proposed.

Simultaneously with these, it is proposed to collect, with the aid of Engineer Officers, Officers of the Revenue Survey, and by donations from individuals interested in the subject, specimens of similar products and processes of manufacture of this country, which will be arranged in a manner convenient for comparison with the foregoing, and for exhibiting at one view the mineral resources of India.

To these will be added specimens of soils, and other substances, showing the application of Geology to Agriculture; specimens of materials used for public buildings, and for roads; models of machinery adapted to mining and agriculture in India; and, lastly, records of mining operations which have been undertaken, or are still in progress.

Materials will thus be obtained, at no distant date, for a Museum designed to illustrate the application of geology to the useful purposes of life, to be entitled " The Museum of Economic Geology of India."

The Museum already possesses a series of specimens of British coal and ironstone from the South Wales and South Staffordshire districts, from the forest of Dean, and from Newcastle. In British tin and copper ores, chiefly from Cornwall, the collection may be considered complete.

The collection of specimens, exhibiting the various stages of metallurgical processes, comprises illustrative series of iron-smelting, and manufacture, as practised in South Wales; of the tin smelting of Cornwall; and of copper smelting, as practised at Swansea. To these, it is intended to add the Bristol mode of manufacturing brass and the

new and old methods of reducing zinc from its ores. Other mineral substances employed in the arts and manufactures will also be included, such as those illustrative of porcelain, common earthenware, pottery, fire bricks, and other manufactures from clays and their compounds, and of metallic oxides and earths employed as pigments, showing the mode in which they may be usefully and permanently associated with each other; as well as a series showing the important manufacture of glass.

In the agricultural section, specimens of Indian soils and subsoils, or subjacent rocks, will be collected, with information of the mode of treatment and usual produce of the land, together with the conditions of exposure and meteorological influences to which it is subject. By analyzing such specimens, the connection of agricultural products with the chemical and physical properties of the soil, as well the mineral and vegetable substances most fitted for increasing the fertility of the land, will be ascertained; and the results being compared with others similarly obtained in this, or in other countries,* correct principles will be established, either for the introduction of new products of cultivation, or for the improvement of those already existing. The substratum of soils being generally an element in their relative fertility, an inspection of these alone would lead to suggestions of much value to the cultivator, and to a knowledge of the geological character of the upper surface of the country from which they may be taken.

Another section will comprise stones, slates, marbles, porphyries, ornamental granites, and other building materials, as mortars, cements, and other artificial compounds, applicable to architectural and engineering purposes.

A focus will thus be presented, to concentrate all information relating to the Economic Geology of India, and it is considered that a collection of natural products, such as it will contain, may serve to point out localities which would be worthy of attention; and by exciting the in-

* We have learnt, while this Memorandum is passing through the press, that a far wider interest is taken at home in the improvement of India in connection with its agriculture, then has ever heretofore been the case. Our acting Curator, Mr. Piddington, having requested Mr. Stikeman the Secretary to the East India and China Association to procure for him some sugar soils from the West Indies, for comparative analysis with those of India, the Mauritius, &c. Mr. Stikeman applied to Lord John Russell, who, upon the recommendation of Sir John Cam Hobhouse, has kindly obtained an assortment of soils from the West Indies, and their arrival here is daily expected.—Ed.

terest of the private speculator, tend to develop the mineral and agricultural resources of the country. An efficient means would also be afforded, of imparting instruction to native youths, whose services may be made available towards the gradual accomplishment of the objects proposed, with reference to the vast extent of territory which is open to investigation.

It will be perceived from the above, that this Museum is not intended for the reception of specimens of rocks or fossils to illustrate points of theoretical geology, but to exhibit those substances occurring occasionally in the solid crust of the earth and others, which are applicable to the useful purposes of life.

Mineral substances.

To those therefore, who may be requested, or who may be desirous to afford assistance in furtherance of the objects here set forth, it will be sufficient to state, that, any mineral or metallic substances, accompanied by specimens of the rocks in which they are found, with descriptions of locality and mode of occurrence, will be of service to a Museum of this description. The fissures and crevices of rocky strata, either along shores, or in vallies and ravines, should be examined, and indications will often be found in water courses and river beds, whereby metallic ores may be traced to the source from whence they have been abraded. Tin, gold, and platina are usually found in such situations; small rounded masses of the former, denominated stream tin, being scarcely distinguishable, save by their higher specific gravity, from common pebbles. The sands of rivers should be sometimes washed, as should also the alluvial detritus found in valleys or beneath the surface of level plains. Indications of copper are often afforded by a ferruginous and somewhat friable substance near the surface, specimens of which are desirable, as they serve often, with practised miners, to point the probable prospect of ore beneath. The vicinity of rocks, coloured green, blue, &c. may also be worthy of examination.

If with such specimens, the probable thickness of the stratum of rocks in which they occur, its dip, including the angle of inclination to the horizon, and direction of the beds by compass, be given, as well as the direction of any fissures that may be observed, it will enhance the value of the information afforded. A convenient size for specimens, is about three inches square, and about an inch in thickness, those of the accompanying rock, may be four or four and a half by three inches, and about

the same thickness. They should be carefully numbered, both on the specimens themselves, and on the envelope in which they are wrapped; one copy of the list to which the numbers will refer, should be transmitted by dawk, and another placed in the box with the specimens.

Building materials.

Specimens of slates, with the dimensions, quantity, and rate at which they can be obtained; also of marbles, and building stones, cut into six inch cubes, will be desirable. The expense of quarrying and of transport to the nearest water conveyance should be detailed. One side of the cubes should be left to exhibit the exposed or weathered surface of the rock, the others roughly chiselled. The cubes of marble may be polished, except on their under surfaces.

Examination of springs.

The quality of water at the issue of springs, and the sediment deposited by them, should be particularly noticed, as they rise to the surface, generally, at some fault or dislocation of the strata, and will probably be imbued with matter derived from the metallic bodies with which they may have been in contact. Thus, water percolating through a bed of coal has often its surface coated with a thin film of oxide of iron, derived from the decomposition of iron pyrites, diffused through the coal. When traces of coal are discovered, it would be very desirable to transmit pieces of the strata of rock with which it is supposed the coal is associated, stating the extent of surface which the deposit is believed to cover, and the depth at which it is found; accompanied, if possible, by a vertical section, with figured dimensions of the accompanying beds.

Operations of mining and reduction of ores.

Descriptions of native mining operations, and complete series of specimens showing the processes followed in the reduction of ores, in their various stages of progress, to the metallic state, will be highly valued, when accompanied by explanations of the modes of procedure.

Specimens of soils should always be forwarded in connection with communications, and inquiries of agricultural interest.

Soils.

Soils being generally the upper decomposed portions of subjacent mineral substances, whether hard rocks of various kinds, or clays, marls, sands, &c., mingled either naturally or artificially with vegetable and animal matter, it becomes very desirable in collecting specimens of them, that they should be accompanied by others of the hard rocks, clays, marls, sands, &c., on which they rest;

so that by careful analysis of the whole, with due attention to climate and the other obvious conditions to which they may have been exposed, some general and useful results may be brought to light, respecting the soils best fitted for the growth of the various plants usually cultivated in this country.

In selecting soils for the Museum of Economic Geology, care should be taken to obtain fair average specimens of the localities whence it may be considered desirable to send them; and to insure the true sub-soil, subjacent hard rock, clay, sands, &c.; specimens of the latter should be obtained as near as possible beneath the spot whence the soil may have been so selected, for it sometimes happens, that the soil of a field varies in places, from resting upon different kinds of sub-soils.

The soil above hard rocks is not unfrequently separated from them by broken angular fragments, the half-decomposed portions of such hard rocks; specimens therefore of sub-soils, or subjacent mineral substances should, in such cases, be taken from the solid hard rocks beneath, and not from these fragments, which have commonly suffered too much decomposition to exhibit the real chemical composition of the rocks themselves. These angular fragments must not be confounded with gravels, sometimes overspreading hard rocks, to the depth of several feet, and chiefly or wholly composed of rounded pebbles, mixed with earthy, sandy, or clayey matter, the whole being often derived from a distance; for such gravels then form the true sub-soil, and the soil above them would partake of the character of the earth, sand, or clay, mixed with the pebbles, with the addition of the decomposed parts of such of the latter, as may disintegrate by the effects of the weather upon them.

The quantity of soil taken as a specimen, should weigh about a pound; it should be well dried and tied up in a canvass bag, labelled to correspond with a memorandum, in which the general agricultural produce of the spot, whence the specimen was taken, should be noted; the kinds of manure known to have been used upon it mentioned; the amount of grain or other crops per beegah stated; the dimensions of the beegah, and the best kind of produce which has been hitherto obtained from it, specified. A loose label should also be inclosed within the bag to guard against accidents. As so much depends on climate and position, the general character of the seasons should be pointed out, and the aspect of the ground, as regards exposure to

prevalent or hard winds, with any slope the ground may have, and its height above the sea should be stated, specifying if possible, the general temperature of the locality, and the degrees of greatest heat and cold annually experienced.

With respect to specimens of sub-soils, if of marl, sand, or clay, portions weighing about a pound, should be dried, tied up in a canvas bag, and labelled, to correspond with the respective soils above them. If the subjacent rocks be hard, a piece weighing also a pound, and fresh broken from the body of the rock, as nearly as possible beneath the spot whence any specimen of soil may have been selected, would suffice, and should be wrapped in strong brown paper, labelled to correspond with the soil above it. As specimens of many sub-soils may be rendered valuable for the purpose of illustrating those either well or ill suited to the growth of such trees as by their roots penetrate beneath the upper soil, commonly known as vegetable mould or humus, and which upper soil supports the great bulk of the plants commonly cultivated; it would be desirable to add a memorandum to any specimens which may serve to illustrate points of that kind. All specimens of soils should, if possible, be enveloped in wax cloth, and even packed in tin cases or cannisters, if any are at hand.

When a sufficient number of specimens in either of the departments here mentioned, has been collected, they should be packed in a box, and be sent by the cheapest, most efficient, and safe conveyance, directed—

On Service.

The Curator of the Museum of the Asiatic Society,
Calcutta.

For the Museum of Economic Geology.

At the same time a communication should be addressed to the Curator of the Museum of the Asiatic Society, under cover to

The Secretary to the Government of Bengal,
Fort William,

stating the conveyance by which the specimens have been forwarded, with copies of the memoranda attached to them, referring to numbers on the specimens, in order, as much as possible, to prevent their loss.

Calcutta:
22*nd January*, 1841.

I have printed with unfeigned pleasure, the foregoing memorandum, to the value of which no recommendation can add. Every friend to India, whether connected with the Society or not, will, it is earnestly hoped, aid in accomplishing the great ends, to which, by the liberality of the Court of Directors and of the Government of India, it may now aim; viz. the full development of the agricultural and mineral resources of the country. Since this memoir was read to the Society, the following contributions to the Museum of Economic Geology, in addition to the collections sent out by the Court of Directors, under the care of Capt. Tremenheere, have been received.

Mr. Piddington, Acting Curator, As. Soc. Museum.

- Specimens of cotton, coffee, sugar, tobacco, and tea soils, &c. from India, the Mauritius, United States, Singapore, &c. of which many are analysed.
- Specimens of Burdwan iron ores: analysed.
- Specimens of the earths used in the curious red glazing of the native sugar pans.
- Specimen of white clay from Rotasghur, which may be used like pipe clay for claying sugar.

I doubt not that we shall shortly be enabled to add many more to this list. To use the words of Mr. Piddington, "Our friends have only to recollect, that nothing pertaining to, or derived from the earth, if useful to man, can be unacceptable to our intended collection, and that even what may to them appear an every-day matter, and of no moment, may be fraught with important results in the hands of others."

I append to this valuable paper, further correspondence of interest to the Society, and to subscribers to the Journal on this important subject of Geological research, it having been put at my disposal by the Committee of Papers.

H

G. A. Bushby, *Esq. Secretary to the Government of India,*
Sir, *General Department.*

Being authorised by the Honorable Court of Directors to deliver to the Government of India certain specimens illustrative of the mineral productions of England, I have now the honour to report my arri-

val at Calcutta, on the ship "Lord Hungerford," with these specimens under my charge. They consist of

43 Specimens of coal from the South Wales and South Staffordshire Coal districts; presented by Mr. H. T. De la Beche, F.R.S. &c., Director of the Museum of Economic Geology, under Her Majesty's Government.

10 Specimens of coal, and others of ironstone and limestone from the principal working beds near Birmingham; presented by J. S. Dawes, Esq.

50 Specimens of copper and other metallic ores, chiefly from Cornwall; presented by Mr. H. T. De la Beche.

119 Specimens of the ores of iron, copper, and tin, from South Wales, Cornwall, and elsewhere, collected by myself, amongst which are many specimens of copper ores; presented by Seymour Tremenheere, Esq.

24 Specimens illustrative of the process of tin smelting, exhibiting each stage of progress, from the rough ore to the metallic state; presented by Thomas Bolitho, Esq. of Penzance.

Details concerning the above are entered in a book, which is forwarded herewith, on the plan followed at the Museum of Economic Geology, wherein it is intended to describe the mineralogical character and geological connection of each specimen, together with such information as may be useful in tracing indications of similar substances in India.

The form of this, as well as of books of other Departments, kept at the Museum, is given in enclosure No. 1.

In addition to the specimens which have been enumerated, others have been promised by gentlemen connected with mining and smelting establishments; and as arrangements were made at the India House for their immediate dispatch, they may be expected shortly to arrive. They include,

Specimens of the process of copper smelting, as practised at Swansea; by H. Vigors, Esq.

Specimens illustrative of the modes in which the Cornish copper, lodes, occur in rock formations.

Specimens of the coal beds, and of ironstone from the Penydarren works at Merthyr Tydfil, and of the process

of manufacture of different kinds of iron ; by G. Grenfell, Esq.

Specimens of the principal coal beds, and of the iron ore, worked in the Forest of Dean ; by — Protheroe, Esq.

Specimens of the principal working beds of the Newcastle coal field ; by Charles Bigge, Esq.

Together with others, if the Government should desire them, which Mr. De la Beche will, I have no doubt, with the consent of the Commissioners of Her Majesty's Woods and Forests, be able to forward from time to time from the Museum of Economic Geology ; many duplicates and spare pieces being often available for the purpose.

Some of the leading features of the mineral wealth of England, and the methods by which it is turned to the best advantage, will be thus represented, and will afford the means of comparison with similar products and processes in this country.

The mineral resources of India although more abundant, and more generally diffused than those of any other portion of the globe of equal surface, have hitherto attracted little attention ; and have been aided in a very slight degree by the means which are necessary to their proper development. The search for metallic ores has been unguided either by the principles of science, or by the practice of other mining countries and workings conducted without the skill and power required to prosecute them successfully, have been confined to within small distances from the surface. Hence the stores of useful metals which India is known to possess remain comparatively untouched, and present at this day, almost a maiden field for improvement.

Enclosure No. 2, represents in a tabular form, localities wherein ores of the useful metals have been worked, and others which have been observed and recorded. The following is an abstract of the paper alluded to, showing the number of places in each of the principal ranges of hills, which produce the undermentioned ores.

	Iron.	Copper.	Tin.	Lead.	Silver.	Gold.	Antimony.	Sulphur.
Himalaya range, ...	9	10	...	4	...	river beds.	...	4
Aravully, ...	6	10	...	5	1	...	1	...
Chittore, ...								
Vindhya, ...	17	...	...	1	...	...	...	...
Kasya, ...	3	...	...	...	...	...	...	...
Assam Territory, ...	1	...	...	...	...	river beds.	...	...
Tenasserim, ...	2	1	1	2	...	...	1	...
Malabar range, ...	31	6	...	2	...	river beds.	...	3
Coromandel, ...								
Total, ...	69	27	1	14	1	river beds.	2	7

The extensive distribution of iron ores of good quality, is the leading feature of Indian mineralogy. These are found in great abundance in every range of hills, in some of which they have been worked on a very limited scale, but with great success, for long periods of time. In several instances, beds of coal occur contiguous to them, as at Hoshungabad, Palamow, Sheregur in the Burdwan district, on the Adjai, seventy miles south of Boglepore, Serrareem, and Cherrapoonjee.

The iron districts, Marwar, Bundelkund, a portion of Malwa, Behar, and Sambhulpore,* are situated within the limits of the great sandstone formation with which the coal measures of India are associated. It extends in a broad band across the centre of Hindoostan, from the valley of Assam westward, to that of the Indus, and it is probable that coal will be found in various parts of this formation, and sufficiently near to these deposits of iron, to render them extensively available for economical purposes. In the districts of Saugur, Jabulpore, and in the valley of the Nerbudda, limestone also occurs, the connection of which is important, as upon the union of these three substances, the success of iron-works depends.

This extensive sandstone tract, presents also another source of interest. In it the diamond mines of Punnah in Bundelkund are situated, and the strata here are believed to be identical with those containing the diamond breccia of the Ellore district, and of Cadapah, on the Pennar. These

* Captain Ouseley discovered a rich field of excellent coal on the banks of the Hurdah (Hutsoo of the maps) in last November.

last have been traced as far north as Nagpoor, and other intermediate points of connection with the Bundelkund formation may also be found.

The Himalayas at Kumaon, the Aravully range at Shekawattee, and the hills of the Nellore district, are the only portions of country which have been worked for copper: very few other localities are yet known; but in such extensive ranges of primary mountains of similar character, it may be asserted that deposits of copper are not confined to these localities only.

The Aravully range is of moderate elevation, and appears to offer facilities for further examination. The Singhana copper mines are at the northern extremity of this range, where the disturbing forces have probably acted with less intensity than elsewhere, and there is reason to believe that the lines of fissure in other portions, especially near the junction of the stratified rocks with granite, may partake of the same cupriferous character. This range has been found to be productive of lead also.

There is no evidence of tin westward of the Bramahpootra, but it occurs in alluvial ground in many parts of the eastern peninsula, from Burmah to the extremity of Malacca, Sumatra, and Banca where the chief deposit exists; abundant sources therefore of this metal remain unexplored in the ranges of hills which diverge to the south-east from the great Himalayan chain, to form this peninsula, of which Sumatra and Banca seem but disconnected portions; and it will most likely appear that Assam, at the northern extremity of this stanniferous country, will also yield tin in its alluvial formations, derived from the Himalayas, by which it is bounded.

These ranges of hills, are likewise the repositories from whence the rivers of Assam, Burmah, Ava, &c. receive the gold dust with which their sands are charged.

(Signed) G. B. Tremenheere,
Capt., Engineers.

Extract from Letter No. 70, *from the Secretary to the Government of Bengal, General Department, to Captain* G. B. Tremenheere, *dated the* 13*th January*, 1841.

In reply to your letter and its enclosures of the 24th ultimo, I am directed to convey to you the acknowledgments of the Right Honorable the Governor of Bengal, for the information and suggestions

therein contained, and for the specimens of the mineral productions of England brought out by you.

A copy of your communication will be forwarded to the Asiatic Society, in whose rooms you will be pleased, agreeably to the accommodation which has been tendered by that body, to place the collection.

I am desired to observe, that if during your absence you will maintain a correspondence with the Curator of the Society's Museum, you may turn to servicable account the experience which you have acquired in England, for the formation of a Museum of Economic Geology, and the Asiatic Society will without doubt, upon any occasional visit which you may make to Calcutta, give you every facility of inspection, and allow such weight to your suggestions, as consistently with their rules may tend to the furtherance of the object in view.

It is the intention of the Right Honorable the Governor of Bengal to avail himself of your services and acquirements, in consequence of your appointment to the department of public works in the Tenasserim provinces, and to the superintendence of the Government forests, for the further prosecution of the inquiries commenced by the late Dr. Helfer into the mineral and commercial resources of the Tenasserim province, with a view to the development of the natural productions of that country.

Your particular attention will be directed in all your excursions to the practical geology and mineralogy of the Tenasserim territory, and you will report on the means and prospects of working any of the mines that have been, or may be discovered, and furnish specimens of all productions, in every possible case in duplicate, for the Government, and the Honorable the Court of Directors.

Note by Captain Tremenheere.

The following are suggestions concerning the mode by which the collection of geological specimens arrived from England, may be made useful.

By assigning for their reception a room in some public building, where they should be arranged in cabinets under glass, in a manner convenient for public inspection.

With them, or in an adjoining apartment, might be placed models of such machinery as is suited to the purposes of agriculture or mining in India.

A focus would thus be presented for the concentration of specimens of rocks, minerals, metallurgical processes, soils &c., from every locality, whereby a knowledge of the mineral resources, as well as of the capa-

bilities of any district, in an agricultural point of view, would be gradually obtained.

These specimens, with descriptions accompanying, might be prepared according to printed instructions of the Committee of the Royal Society, framed for the guidance of those employed in Magnetic Observatories, whereby accurate accounts, with specimens, may be transmitted by persons entirely unacquainted with the sciences of geology, mineralogy or agriculture.

The Engineer Officers, or those of the Revenue Survey, with whose departments the physical character of the country is nearly connected, seem to present the best means by which such information may be obtained.

The specimens on their receipt, might undergo comparison with those already arranged, and be subjected, if essential towards the elucidation of a proposed object, to chemical analysis, for which purpose the services of a chemical analyst would be necessary.

Localities would thus be indicated, which might appear to be deserving of more particular examination, and to which it would be desirable to send a person properly qualified for the purpose.

It is conceived, that information so obtained would not only be of service to the Government, but, as the fullest publicity is intended, might serve to encourage private enterprize.

If such a system were in operation, it would afford the best means of imparting instruction in these subjects, both by lecture and manipulation, to youths of the medical school, or others who might eventually be attached to Executive Engineers, or to Collectors of Revenue; serving thus as an efficient medium of communication between such functionaries and the natives on matters tending to develop the natural resources of the country.

The reception of mining records is another object which may be combined with the above one, of great importance at this period, since records of all operations hitherto conducted under European superintendence can now be easily obtained. The want of such records in England has been much felt, and has been the cause of much useless expenditure of capital in modern times.

A collection of standard books, treating on the subjects above referred to, should be by degrees provided for.

G. B. Tremenheere.
Captain, Engineers.

Form No. 1.

Ores of the useful Metals, Coals, and Mineral Mining Specimens, generally.

No.	Mineralogical description.	Locality.	Chemical composition.	How obtained.	Where obtained.	Donor's name, if presented.	Remarks.

No. 2.

Metallurgical Processes, and Manufactured Articles.

No.	Kind of substance.	Where manufactured.	By whom manufactured.	Composition of the substance.	How and where obtained.	Donor's name, if presented.	Remarks.

No. 3.

Specimens of Soils, and of the Rocks beneath them.

No.	Name of rock.	Mineral composition of rock.	General character of soil.	Analysis of the soil.	Character of agricultural produce of the soil.	Where and how obtained.	Name of donor.	Remarks.

No. 4.

Polished Granites, Porphyrics, Marbles, &c., worked into columns, &c.

No.	Kind of substance.	Locality.	Form into which the specimen is worked.	Where, and by whom worked into form.	How and where obtained.	Donor's name, if presented.	Remarks.

No. 5.

Stones employed for Architectural or Engineering purposes.

No.	Kind of rock.	Geological series to which it belongs.	Locality.	Owner's name and residence.	Mineral composition.	Chemical analysis.	Specific gravity.	Resistance to pressure.	Resistance to frost.	Where employed & condition of buildings constructed of it.	Price per cubic foot or ton.	Where and how obtained.	Donor's name, if presented.	Remarks.

No. 6.

Museum of Economic Geology, Department of Her Majesty's Woods, &c. Return for the Quarter ending——

No.	Additions to the Museum.	When received.	Whether presented or purchased; if presented, by whom?	No. in Catalogue of Museum.	Number and description of analysis made for the Museum.	Number and description of analysis made for the Public.	Number and description of lectures delivered at the Museum.	Number of entries to the lectures.	Remarks.

Ores of the useful Metals found in India.

No.	Description of Ore.	Locality.	Province.	Hill range.	Mineralogical description.	Remarks.	Authority.
	Iron.	Dhamakot	Kumaon, ...	Himalaya, ...	Hematite, ...	An extensive bed, yielding from 30 to 60 per cent. of good iron.	Captain Herbert.
	,,	Ramgar, ...	Kumaon, ...	Himalaya, ...	Micaceous, ...	Supposed to be connected with the above.	
	,,	Kutsari, ...	Kumaon, ...	Himalaya, ...	Compact, ...	Yields the best iron in the province, & is accompanied with limestone.	
	,,	Chowgark, ...	Kumaon, ...	Himalaya, ...	Yellow oxide,	Contains some Manganese, and would afford a good steel.	
	,,	Sil, ...	Bishchir, ...	Himalaya, ...	Magnetic, ...	The iron made here is much in demand for sword blades. This and the Kutsari Mine are deemed worthy of attention.	
	,,	Kalsi, ...	Kumaon, ...	Himalaya, ...	Specular, ...	An extensive bed.	
	,,	Phagone, ...	Surmore, ...	Himalaya, ...	....	A large vein of Iron Ore.	
	,,	Chipal, ...	Surmore, ...	Himalaya, ...	....		Dr. Royle.
	,,	Deyrah, ...	....	Himalaya, ...	....	In the descent to Deyrah in quantities sufficient to be profitably worked.	
	,,	....	Manvar, ...	Aravully, ...	....	Very abundant in the hills, which bound these provinces. Several foundries are established.	Sir John Malcolm.
	,,	....	Mewar, ...	Aravully, ...	....		
	,,	Baug, ...	Malwa, ...	Vindhya, ...	....	Supplies iron to Indore.	
	,,	Chandurgh, ...	Malwa, ...	Vindhya, ...	....	Ore of quality abounds, but from the imperfect mode of working the metal, is only valued for common purposes.	Captain Dangerfield.
	,,	Kantcote, ...	Malwa, ...	Vindhya, ...	....		
	,,	Cheettakairee, ..	Malwa, ...	Chittore, ...	....	An ore of good quality and abundant in this neighbourhood.	
	,,	Gwalior, ...	....	Chittore, ...	Hematite, ...	This iron is much esteemed.	
	,,	Gorakpore, ...	....	Valley of the	....	Beragur, Dangui, Baila, Powri, Mygowa, Moguila, Birsinpoor, Deori, Rijoa, Bamna, & Personah are other localities in this valley. An argillaceous limestone is near.	Captain Franklin.
	,,	Sakri, ...	....	Nurbudda, ...	....		
	,,	Fcerozepoor, ...	....	Aravully, ...	Hematite,	Iron is sold at these places, at 10 seers per Rupee.	
	,,	Narnoul, ...	....	Aravully, ...	Hematite,		

Ores of the useful Metals found in India—(Continued.)

No.	Description of Ore.	Locality.	Province.	Hill range.	Mineralogical description,	Remarks.	Authority.
	Iron.	Hoshungabad, ..	Bhopal, ...	Vindhya, ...	....	Coal is said to accompany it on both banks of the Bhoorna.	Lieut. Finnis.
	,,	Heerapore, ...	Bundelkund,..	....	Hematite, ...	This iron ranks next to that of Gwalior	Capt. Herbert.
	,,	Katola, ...	Bundelkund,..	....	....	Dharmuni, Waldana, and Sorai or other localities contiguous.	
	,,	Punnah,.....	Bundelkund,	....	....		
	,,	Boglepore, ...	Bahar, ...	Vindhya, ...	....	70 miles south of this it occurs with coal on the Adjai. The hilly portion of this province is rich in iron.	
	,,	....	Palamow, ..	....	....	Occurs with coal. The ore is rich and abundant.	
	,,	Sircunda, ...	Rajmahl, ...	Rajmahl, ...	....	In great abundance.	Mr. Glass.
	,,	Mesadhe, ...	....	....	....	Affords a very superior iron, and is abundant.	
	,,	Sheargur, ...	Burdwan, ...	....	....	Occurs with coal. The whole district affords valuable ores, which yield 50 per cent. of metal.	Mr. Jones.
	,,	Beradroog, ...	Goondwana, ..	Sautpore, ...	....	Coal is found here also on the river Towa.	
	,,	Amdeah, ...	Sumbhulpore,	....	....		Mr. Rose.
	,,	Tuesmahl, ...	Saugor, ...	....	....	30 miles NE. of Saugor, with limestone.	Rev. R. Everest.
	,,	Pandria, ...	Silhet, ...	Kasya, ...	....		Dr. McClelland.
	,,	Serrareem, ...	....	Kasya, ...	....	Occurs with coal. 20 seers of iron are sold for a rupee.	Mr. Jones.
	,,	Cherrapoonjee...	....	Kasya, ...	....	Occurs with coal,	Col. Watson.
	,,	....	Assam, ...	....	....	Celebrated for its iron mines and steel.	
	,,	Moulmein, ...	....	....	Red iron clay, ..	Anthracite coal also occurs here.	Capt. Foley.
	,,	Tenasserim, ...	....	....	Oxide of iron, ..	Limestone also is near.	Capt. Low.
	,,	Tavoy, ...	....	....	Magnetic, ...		
	,,	....	Orissa, ...	....	....		
	,,	....	Hyderabad, ..	....	Hematite, ...	The ores are poor, and the iron expensive.	Dr. Voysey.
	,,	Doodgwana, ...	Hyderabad, ..	Sichell, ...	Hydrate, ...	At Indore also.	Dr. Malcolmson.

Ores of the useful Metals found in India—(Continued.)

No.	Description of Ore.	Locality.	Province.	Hill range.	Mineralogical description.	Remarks.	Authority.
	Iron.	Rajamundry, ..	N. Circar, ...	....	....	In considerable quantity.	
	,,	Ghettypore, ...	Mysore, ...	Malabar, ...	....	Steel is manufactured.	
	,,	Chittledroog, ..	Mysore, ...	....	Iron glance, ...		
	,,	Darmaparam, ..	Mysore, ...	....	Clay iron stone,		
	,,	Yevogully, ...	Mysore, ...	....	Micaceous, ..	Near Sautgur. This ore is rich and abundant in the mountains of the Carnatic from Vellore to the Ghauts.	
	,,	Bangalore, ..	....	....	....	At Maugry there are many forges and a manufacture of steel.	Dr. Heyne.
	,,	Kudavigada, ...	Buddela, ...	....	Iron glance, ...		
	,,	Ramanakapetta,	Ellore, ...	.. . .	....	Ore can be obtained in any quantity, and in six other villages.	
	,,	Severndroog, ..	Koncan, ...	....	....	Also at Hurryhur, and Ruttengherry.	
		....	Guzerat, ...	....	....	On the SW. coast there are extensive iron works.	
	,,	Spendamungolem,	Salem, ...	....	....	Extensive iron works established by Mr. Heath; steel also is made.	Mr. Heath.
	,,	Konasamundrum,	....	Nermul, ...	Iron clay, ...	Celebrated for its steel called "Wootz," which is carried to Persia. The iron used in manufacture is in proportion of three parts from Mertpallee, and two from Condapoor. 110 Rupees weight, sold for 8 annas.	
	,,	Deemdoortee, ..	....	....	Magnetic, ...	Has been used for ages in making Damascus steel. Two-fifths of Indore iron are used in the process. The iron is said to be superior to any English iron, and even to the best Swedish. The mines afford a boundless supply, and are easily wrought.	Dr. Malcolmson.
	,,	Bangnapully, ..	Nellore, ...	....	Specular & Magnetic, ...	Occurs in the sandstone or Diamond breccia, also at Punnundrow, but not worked.	Dr. Malcolmson.

Ores of the useful Metals found in India—(Continued.)

No.	Description of Ore.	Locality.	Province.	Hill range.	Mineralogical description.	Remarks.	Authority.
	Iron.	Doodye, ...	Cutch, ...	....	....		Capt. Grant.
	,,	Taggoor, ...	Koncan, ...	....	Magnetic, ...		
	,, ...	....	Coomlietor, ..	....	....		
	Copper.	Dhanpur, ...	Kumaon, ...	Himalaya, ...	....	This is the principal mine in the district. The ore yields 50 per cent. of copper. It occurs in limestone rock and is easily worked.	
	,,	Dhobri, ...	Kumaon, ...	Himalaya, ...	....		
	,,	Gangoli, ...	Kumaon, ...	Himalaya, ...	Double sulphuret,	These mines are next in importance to those of Dhanpur and Dhobri. They occur in beds of indurated talc, which is easily excavated. At Pokri the schist is so soft as to cause great obstruction to the miners. At Khari ore has been observed in small quantity. All these ores are free from arsenic.	Capt. Herbert.
	,,	Sira, ...	Kumaon, ...	Himalaya, ...	Double sulphuret,		
	,,	Pokri, ...	Kumaon, ...	Himalaya, ...	Double sulphuret,		
	,,	Khari, ...	Kumaon, ...	Himalaya, ...	....		
	,,	Shor Gurong, ..	Kumaon, ...	Himalaya, ...	....		
	,,	Khalsee, ...	....	Himalaya, ...	....		
	,,	Katmandu, ...	Nepaul, ...	Himalaya, ...	....	Has considerable manufactories of copper, brass, and bell metal.	Dr. Royle. Mr. Hodgson.
	,,	....	Gurwal	Himalaya, ...	....		Lt. Webb.
	,,	Singhana, ...	Shekawattee,	Aravully, ...	Yellow & grey, sulphurets and carbonates, ..	These mines have been worked for centuries. They are farmed annually for 14,000 rupees.	Capt. Boileau.
	,,	Khetri, ...	Shekawattee,	Aravully, ...			
	,,	Buboe, ...	Shekawattee,	Aravully, ...			
	,,	Ajmere, ...	Rajasthan, ...	Aravully, ...	Red oxides and carbonates,	The lode runs north and south. It is said that all the Ajmere valley, from Kishengurh to Rajgurh is traversed by copper lodes.	Capt. Dixon.
	,,	Rajgurh, ...	Rajasthan, ...	Aravully, ...			
	,,	Rajauri, ...	Rajasthan, ...	Aravully, ...			
	,,	Jeypoor, ...	Rajasthan, ...	Aravully, ...	....	Mines to the north are said to have formerly yielded revenue.	Col. Todd.
	,,	Saloombra, ...	Mewar, ...	....	....	Copper is coined by the chief of Saloombra,	
	,,	Mandal, ...	Mewar, ...	....	....	And in the valley of Oodeypoor.	Mr. J. Hardie.

Ores of the useful Metals found in India—(Continued.)

No.	Description of Ore.	Locality.	Province.	Hill range.	Mineralogical description.	Remarks.	Authority.
	Copper.	Basawur, ...	Bhurtpore, ...	....	....	This working has been abandoned.	Capt. Boileau.
	,,	Nellore, ...	....	....	Carbonate of copper with red oxide of iron.	The Indian Copper Mining Company has been formed at Madras, to turn the mineral stores of this district to advantage. The ores are free from sulphur and arsenic, and become quite pure on smelting.	Dr. Heyne.
	,,	Ongole, ...	....	....			
	,,	Wamgapadu, .	....	....			
	,,	Gongpettah, ...	....	....			
	,,	Yerrapully, ...	....	....			
	,,	Agricondolah, ..	....	....			
	,,	Moulmein, ...	....	....	Carbonate, ...	Observed in limestone rock in excavations made for silver. In Siam and Tonquin. Mines are worked also at Acheen.	
	Tin.	Mergui, ...	Tenasserim, ..	....	....	Said to abound in tin.	
	,,	Singapore, ...	Malacca, ...	....	Stream Tin.	These mines have been reported upon by Captain Low; at Perar the tin is found 7 feet from the surface. Near to Prince of Wales Island, yields a pure tin called 'Ealin.'	Capt. Low.
	,,	Perar, ...	Malacca, ...	....			
	,,	Legar, ...	Malacca, ...	....			
	,,	Junk Ceylon, ..	....	....	....	500 tons were at one time exported annually, but now much less.	
	,,	Sumatra, ...	....	....	....		
	,,	Bancah, ...	....	....	....		
	,,	Burmah, ...	....	....	....		
	,,	Martaban, ...	....	....	....		
	Lead.	Borela, ...	Jaunsar, ...	Himalaya, ...	Granular Galena,	This mine paid formerly 2,000 Rs. annual rent. Capt Drummond with a Cornish miner has gone there.	Capt. Herbert.
	,,	Maiyar, ...	Jaunsar, ...	Himalaya, ...	....	Paid formerly 4,000 Rupees annually.	
	,,	Bhatnor, ...	Jaunsar, ...	Himalaya, ...	....	Numerous galleries exist here, as well as at Borela.	
	,,	....	Nepaul, ...	Himalaya, ...	....		Mr. J. Harding.
	,,	Jowar, ...	Oodeypore, ..	Aravully, ...	Argentiferous, ..		
	,,	Ajmere, ...	Rajasthan, ...	Aravully, ...	Galena, ...	Mines have been formerly worked with advantage.	Sir J. Malcolm.

Ores of the useful Metals found in India—(Continued.)

No.	Description of Ore.	Locality.	Province.	Hill range.	Mineralogical description.	Remarks.	Authority.
	Lead.	Jeypoor, ...	Rajasthan,....	Aravully, ...	....	Mines to the north are said to have yielded much revenue.	Capt. Dangerfield.
	,,	Nuseerabad, ...	Rajasthan,....	Aravully, ...	....	Has been worked by Capt. Dixon for some years.	Capt. Dixon.
	,,	Jhodepoor, ...	Manvar, ...	....	....	30 miles to the SE.	
	,,	Luchmeepore, ..	Boglepore,....	Vindhya, ...	....	40 miles from Boglepore there is a rich vein of galena.	Mr. Jones.
	,,	Bangnapilly, ..	Nellore, ...	....	Argentiferous galena, ...	A mine here formerly furnished the district with lead.	Dr. Heyne.
	,,	Parsuni, ...	Nagpur, ...	....	....	Lead has been found in the neighbouring hills.	Capt. Jenkins.
	,,	Tenasserim, ...	....	....	....	There are mines also in Ava, Burmah, and Siam.	Capt. Low.
	,,	Moulmein, ...	....	....	....		Capt. Foley.
	Silver.	Jowar, ...	Oodeypore, ..	Aravully, ...	Argentiferous galena.		
	,,	Assam, ...	....	....	....		
	,,	Bhootan, ...	....	....	....		
	,,	Siam, ...	....	....	....		
	,,	Umeerapoor,....	Burmah, ...	....	....		
	,,	Badoocm, ...	Burmah, ...	....	....	The principal mines.	
	,,	Woobalcolla, ..	Burmah, ...	....	....		
	,,	Bencoolen, ...	Sumatra, ...	....	....	There are rich mines at Songhipago, Songhiabo, and Sohungong.	
	,,	Padang, ...	....	....	....		
	Gold.	....	Nepaul, ...	....	....	In the beds of rivers issuing from the Himalayas.	Capt. Herbert.
	,,	....	Punjaub, ...	....	....		
	,,	The Gomti river,	....	....	....		
	,,	The Mahanuddy River.	....	....	....	The rivers of Berar, Golcondah, and the Deccan carry down gold dust in considerable quantities.	

Ores of the useful Metals found in India—(Continued.)

No.	Description of Ore.	Locality.	Province.	Hill range	Mineralogical description.	Remarks.	Authority.
61	Gold.	Belamongslum,	Mysore,				
	,,	Assam,				Contains rich mines of gold.	Capt. Warren.
	,,	Badooem,	Ava,			Gold mines worked.	
	,,	Woobooltae,	Burmah,			Also at Umcerapoorah, Manipur; Noobooltoe is the richest.	
	,,	Bantuphannua,	Siam,			The mines yield 15,000 Rupees a year. They are in the latitude of Mergui.	
	,,	Batang Morung,	Malacca,			Occurs in granite; Cambodia, Laos, Cochin-China, Pegue, and Tonquin have gold also.	Lieut. Newbold.
	,,	Comtah,	Nagpur,				Capt. Jenkins.
	,,	Kah River,	Moradabad,				Mr. Ravenshaw.
	Antimony.		Malwa,			West of the frontier.	
	,,	Moulmein,			Sulphuret.		
	,,	Tavoy,	Malacca,			Also in Burmah and Siam.	
	Platina	Kamoe,	Ava,			In river beds with the gold washings.	Major Burney.
	Quieksilver,	Andaman Islands,					
	Manganese,		Ava,				
	Plumbago,			Himalaya,		Has been observed near the Soonth river in considerable quantities.	
	Sulphate of Iron,		Behar,			Occurs in efflorescence in rocks containing iron pyrites.	Mr. J. Stephenson.
	Sulphur,		Kumaon,	Himalaya,		Deposits in the gallerics of lead mines and in river beds, as the Tonse, Ramgunge, and Jaunsar.	
	,,	Amalapor,				In a lake in the territory of the Peddsore Rajah.	
	,,	Colair Lake,	Ellore,			And at Cuddapah in the Nellore district.	
	,,	Sahansadhara.		Himalaya,		Below Mussooree there is a sulphurous spring.	Dr. Royle.
	Diamonds.	Malavully,	Ellore,			This is one of seven villages in the district near which diamond mines exist in the valley of the Kistnah.	Dr. Heyne.
	,,	Kondapully,	Ellore,				

Ores of the useful Metals found in India—(Concluded.)

No.	Description of Ore.	Locality.	Province.	Hill range.	Mineralogical description.	Remarks.	Authority.
	Diamonds.	Cuddapah, ...	....	....	....	In the valley of the Pennar. There are several mines in the valleys between these places and the low grounds to the North.	Dr. Heyne.
	,,	Gooty, ...	....	....	....		
	,,	Golconda, ...	....	....	....		
	,,	Budrachallam, ..	....	....	....	On the Godavery.	
	,,	Sumbhulpore, ..	....	....	....	On the Mahanuddy.	
	,,	Kurnool, ...	....	....	....		
	,,	Punnah, ...	Bundelkund,..	....	....	The mines here yield 1,20,000 rupees annually to the Rajas of Punnah, Banda, Chercarie and Joitpore.	
	Alum.	Sahibgong, ...	Boglepore,....	Vindhya, ...	Sulphate of Alumina.	Occurs in efflorescence in alum slate.	Mr. Campbell.
	,,	....	Nepaul, ...	....		Found in the Lower, Central, and Upper hills, within a few days' journey of the Ganges.	
	Cornelian.	Rae Peepla, ...	Baroach, ...	Suatpore, ...	....	The annual value formerly exported from Bombay was 11,000 lbs the produce of the mines.	
	Corundum.	Salem, ...	Carnatic, ...	....	....		
	,,	Kyalphyen, ...	Ava, ...	....	....		
	,,	Nellore, ...	....	....	....	In the Pennar district, and in the mountains of the Carnatic.	
	Ruby.	Songayuem, ...	Coimbatoor, ..	....	....	Other valuable gems, as the Spinel ruby, Zircon, Cat's eye, and Topaz, occur in the rivers of the sienitic and basaltic districts of the Peninsula, and in Ceylon.	
	,,	Kyalphyen, ...	Ava, ...	....	....		
	Sapphire.	Kyalphyen, ...	Ava, ...	....	....		
	Garnet.	Palunshah, ...	Hyderabad, ..	....	....	A mine of garnets.	Dr. Voysey.
						Porcelain earth is found at Ootacamund in the Neilgherries; and slates in any quantity at Bagulkata in the western Ghauts.	Dr. Benza.
							Lieut. Jervis.

Grammatical construction of the Ho language.—By Lieut. TICKELL.

I hope due allowances will be made for the imperfectness of the grammatical details here given, when it is remembered that the Ho language has no written character, nor does there exist a person, native of the Kolehan or otherwise, who could give me the slightest assistance on this point.

It would be trite to observe that grammar is as inherent and essential to all languages, even the most barbarous, as a vocabulary itself. By first learning a number of the words and sentences arbitrarily, the system on which they are founded may be detected in due time by patient comparisons of them, even when the speakers themselves are unable to give the inquirer the least information on the construction of what they are saying. With this difficulty once mastered, it is inconceivable with what ease the most (apparently) complex and difficult languages become familiar.

The sounds of the Ho language are exceedingly pure and liquid, without strong aspirates or gutturals, and may be well rendered by the English alphabet, or still better the French one, as that admits of the slight nasal inflection which prevails in many words in the Ho dialect.

Let the following conventions be made to the sound of the vowels, in the ensuing dialogues, &c.

á ——— as in "father," "rather,"
é ——— ,, "prey," "été,"
ī ——— ,, "skip," "trip,"
ee——— ,, "sheep," "peep,"
ȳ ——— ,, "fly," "try,"
aï or aÿ —— ,, longer sound as in "aye, aye?"
ō ——— ,, "bone," "stone,"
oo ——— ,, "fool," "stool,"
*n̤ (nasal n) ,, "Ton" "Fanfaron," (French.)

The long acute vowel sounds, such as *oo* and *ee*, also the letter *r*, are pronounced too liquidly and subtilely to be easily imitated by a stranger, and in some words the inflections of the vowels are inconceivably complex and mellifluous. The general euphony or cadence

* Also g, as the French liquid g, in Coulogne, Boulogne.

of the language is sprightly and cheerful; if the subject be of a complaining nature it subsides into a strange chaunt, the sentences being linked together by such see-saw sounds, as "ná-do na-do enété ná-do" which have no meaning, but serve to connect together the speaker's ideas.

When two or more words come together, the former ending, and the latter beginning with similar vowels, they are joined by ellipsis. as "Hola'lé seniéna," instead of "Hola allé seniéna," *we went yesterday.*

Article.

There are none, (properly speaking), definite or indefinite.

Noun.

There is no distinction of genders, marked or influenced by termination, it being determined by the sense or meaning of the word, whether referring to a *male* or *female* being. Besides *man* and *woman*, "erril" and "èra," *boy* and *girl*, "koá" and "koŏee," names of relations, and those of a few domestic animals, all other nouns are distinguished in their gender by prefixing "Sandee" *male*, or "Enga" *female*, as in Persian or English مادن رینچ نررینچ, *he-bear, she-bear.*

A noun has three numbers, singular, dual, and plural, as in Greek.

The nouns can scarcely be said to have declension as the terminal does not vary either according to number or case, although a distinguishing adjunct, which may be called a 'Pronoun article,' from its nature and use, is added.

	Singular.	Dual.	Plural.
Nom.	Sètá, *a dog.*	Seta king, *two dogs.*	Sèta ko, *dogs.*
Gen.	Sètá-á, *of a dog.*	Seta kingya, *of two dogs.*	Seta koá, *of dogs.*
Ab.	Seta-té, *from a dog.*	Seta king té, *from two dogs.*	Seta ko té, *from dogs.*

The dative, accusative, and vocative cases do not differ from the nominative, being only known from their position in a sentence.

In composition, the noun in an accusative case takes the first place in the sentence, if the nominative be a pronoun; otherwise the noun-nominative precedes, the accusative follows, and the oblique or dative case comes immediately before the verb, sometimes immediately after it. "En ho kajikeeáï áÿa èra," *that man said to his wife,* "Dendka

oé tootigoikeea," *Dendka shot the bird.* "Eeán hōn do chowlee seta emadȳa," *my son gave the dog some rice.*

Adjective.

The adjective does not alter in termination, either in number, case, or gender; and always precedes the noun it qualifies. As "Boogee ho," *a good man;* "Boogee ho-á," *of a good man;* "Boogee ho lo té," *with a good man,* &c. There are no degrees of comparison, but as in Hindustani the qualifying words *very*, or *most of* all, are prefixed to denote grades of quality, as "Etka," *bad,* "Enâ té neeá o etka," *this is worse than that.* "Sabee ré nee o etka minna," *this is worst of all.* "Boogee lèka èra," a *pretty woman.* "Boogee lèka èra ko," *pretty women.*

Pronoun.

The first personal pronoun has four numbers, the singular, dual, plural, and plural comprehensive. The others only the three first, as noticed in the noun-substantives.

The possessive pronouns are the same as the personal, with the genitive inflection *á* added.

Personal Pronouns.

	Singular.	Dual.	Plural.	Pl. comprehensive.
1*st.*	Eeng *or* aïng, *I*	Alleeng, *we two*	Allé, *we*	Aboo, *we all*
2*d.*	Um, *thou*	Abben, *you two*	Appé, *you*	,,
3*d.*	Aÿ *or* áÿo, *he*	Aking, *they two*	Ako, *they*	,,

In speaking, if the person include the person addressed, himself, and every one present, as nominatives or agents, he uses the plural comprehensive. If he exclude the person addressed, he employs the first person plural, as "Hola aboo seniéna," *yesterday we went* (i. e. you and all of us.) "Hola allé seniéna," *yesterday we went* (i. e. not you, we alone.)

The personal pronouns in the nominative case both precede and terminate the verb, optionally with the speaker, as, *I speak,* "Eeng kajitanna" or "Eeng kajitannaïng" or "Kajitannaïng."

I go, "Eeng senotana," or "Eeng senotannaïng," or "Senotannaïng."

And to give energy to the sentence, the pronoun is repeated, with the connect "do" between them, as "Eeng do eeng kajitanna," *T"is I who speak,* "Um do um kombookenna," *Thou alone statest it.*

The most difficult part of their construction is in the dative and accusative cases, which are absorbed in the verbs they are governed by, in a manner unknown to other languages, being placed in the centre of the verb, after the root, and before the tense terminal.

As, *I speak to thee,* "Eeng kaji*me*tanna;" *he spoke to me,* "áÿo kajiked*in*gia;" *he spoke to them,* "kajiked *koái*;" *the tiger saw me* "koola do nelded*in*gia;" *he killed him,* "áÿo goïked*áÿ*a." Here I have underlined the oblique or accusative pronoun, where it comes in, just before the tense terminal of the verb.

Possessive Pronouns.

Singular.	Dual.	Plural.	Pl. comp.
1*st.* Eenga* or áïngia! *my*	alleengia	alléa	abooá
2*d.* Umma, *thy*	abbena	appéa	,,
3*d.* Aÿa, *his*	akingia	akoá	,,

These always precede their substantives.

Demonstrative Pronouns.

Singular.	Dual.	Plural.
Nee *or* inee, *this*	neeking, *these two*	niko, *these*
Neeá *or* ineeá, *of this*	neekingia, *of these two*	neekoá. *of these*
Neeté *or* ineeté, *to, with, &c. this*	neekingté,	neekoté,

En, *that*	enking, *those two*	enko, *those*
Enâ, *of that*	enkingá, *of those two*	enkoá, *of those*
Enté, *by, from, with &c. that*	enkingté,	enkoté,

"Nee" *this,* is sometimes used idiomatically by a person referring to himself. If a Kole were to be asked what countryman he was? he would answer, "Ho nee gé," *I am;* or literally, *this is a Kole.* Of what clan are you? Answer, "Poortee neegé," *I am a Poortee.*

* Pronounced, as 'mignon,' 'Ligne,' &c. in French.

Interrogative Pronouns.

Okoï, *who?*	chikan, *which?*	chiá, *what?*
Okoiá, *whose?*	chikaná, *of which?*	

Relative Pronouns.

Relative pronouns are very vague, the sentence being generally so rendered as to obviate the necessity of them, thus, instead of saying, *The man who went;* a Kole would say, *The gone man,* "Senien Horo."

But at times "Chikana," *whatever,* and "Ena," *that,* are used relatively, as "Chikana um kajeeá, èna eeng áïooma," *what you say, that I will listen to.*

Verbs.

Verbs are either active or neuter. There is no passive voice.

The Infinitive mood is formed by adding *téá* to the root.

The Present participle by adding *tan* or *té.*

The Past participle by affixing *kedté.*

In the active or transitive voice, the Present tense Indicative mood, adds to the root "*tanna,*" in the neuter voice, "*akanna.*"

The Imperfect tense there is none, the Present tense being used, and its Imperfect signification understood by the context.

The Perfect tense is formed by adding in the active voice, "*kidda, keea, kenna, lidda, or tadda,*" to the root. In the neuter voice, "*lena,*" or "*ièna,*" sometimes "*kenna.*"

There is no Pluperfect tense, but greater completion is expressed by conjugating the verb "chabteá," *to finish,* added to the root; much the same way as "chookna" in Hindustanee.

The Future is formed by adding to the root *eea* or *oá,* or sometimes simply *á,* in which latter case the sound of the root is prolonged. Except "nooiteá," *to drink,* which makes "noonooá;" and "roteá," *to gore* (as a bull) "roroá."

The Imperative is formed by adding (in the 2nd person singular) to the root, "*mèn*" and "*omén*" or "*ÿmén,*" if the root end with a consonant. In the other persons *ká* precedes the pronoun, and the simple root of the verb, which will be more clearly shown in conjugating. In a negative sense, "*alum*" or "*alo*" is prefixed to the 2nd personal pronoun, *á* being added to the root; if in the 3rd person, singular, dual,

or plural "*aloka*" is prefixed to the pronoun, and the root alone of the verb is used.

The Subjunctive mood is vague and imperfect. In the Present, and Future tenses "*rèdo*" is added to the root, sometimes together with the word "*honang*," "*derang*," or "*torá*" (signifying conditionality) affixed.

The Past tense is formed in the same way; indeed there appears to be no Past Subjunctive tense; but sometimes the conditional terminal "*rêdo*" is added to the Past perfect Indicative.

This word "*rèdo*" admits the vowel to be affixed to it, or to come immediately before it and after the root.

Conjugation of the verb "Kajĕeteá," *to speak.*

INFINITIVE MOOD.

Present tense—Kajĕetéa, *to speak,*
Present Participle—Kajitan, or Kajienté, *speaking,*
Past Participle—Kajikedté, *having spoken.*

INDICATIVE MOOD.

Present tense.

Sing.		Dual.	Plural.
1st. Person, Aïng,	Kajitanna,	Alleeng—Allé,	Kajitanna,
2d. ,, Um,		Abbeu—Appé,	*I &c. am speaking.*
3d. ,, Aÿo,		Aking—Ako,	

Perfect tense.

1st. Aïng—Alleeng—Allé,	Kajikidda, Kajilidda *or* Kajitadda.
2d. Um— Abben—Appé,	*I &c. spoke or have spoken.*
3d. Aÿo— Aking— Ako,	

Future tense.

Aïng, Um, &c. &c. &c.—Kajeea, *I &c. &c. will speak.*

IMPERATIVE MOOD.

Sing.	Dual. Plural.
Eeng Kakajee, *Let me speak.*	Kajeeaboo *or* Abookakajee, *Let us all, &c.*
Um Kajeemén, *Speak thou.*	Kajee ben *or* Abbenkakajee, *Speak you, &c.*
Ayo Kakajee or Kakajee o kái, *Let him speak,*	Kajeealling *or* Allingkakajee, *Let us, &c.*
	Kajeeallé *or* Alléokakajee, *Let us, &c.*
	Kajeeako *or* Akokakajee, *Let them, &c.*
	Kajeeaking *or* Akingkakajee, *Let them, &c.*

NEGATIVE.

Sing.	Dual. Plural.	
Alokâïng kajeea, *Do not let me speak.* Alum kâjeea, *Speak not.* Alo kaï kajeea, *Do not let him speak.*	Alo k'aboo kajeea. Alo k'allé kajeea. Alla'bben kajeea. Al'appé kajeea. Alo ka'ko kajeea. Alo ka'king kajeea	*Do not let us &c. &c. speak.*

SUBJUNCTIVE MOOD.

Present tense.

Eeng Kajeerèdo, *If I speak.* Um Kajeeredo, *If thou speakest.* Aïo Kjeeredo, *If he speak.*	Aboo, Allé, Abben, Appé, Ako, Aking,	Kajeerèdo, *If we &c. speak.*

Perfect or Pluperfect.

Eeng, Um, &c. &c. &c. Kajeekedrèdo, *If I &c. &c. had spoken.*

CONDITIONAL, OR POTENTIAL.

Eeng Kajëâïng honang, *I would speak.* Um Kajeeum honang, *Thou, &c.* Aÿo Kajeea honang, *He, &c.*	Allé &c. &c. Kajeea honang, *We might or would speak.*

NOTE. As has been before explained, in all these tenses and persons (except in the Imperative) the pronoun may be either prefixed, or affixed, or both.

The same Verb, Conjugated with its Objective Pronoun.

INDICATIVE.

Present tense.

Eeng or Aÿng	Kajeeing tanna,	*I speak to myself.*
,,	Kajee metanna,	*I speak to thee.*
,,	Kajee áïtanna,	*I speak to him.*
,,	Kajee' létanna,	*I speak to ourselves.*
,,	Kajee' ling tanna,	*I speak to us two.*
,,	Kajee' ben tanna,	*I speak to you two.*
,,	Kajee' pétanna,	*I speak to you.*
,,	Kajee king tanna,	*I speak to them two.*
,,	Kajee kotanna,	*I speak to them.*

The same exactly for all the other persons, and tenses, &c.

Perfect tense.

Aïng, Um, Aÿó, &c. &c. &c.	Kajikedingiá.	*I, thou, he, &c. &c. &c.*	*spoke to myself.*
	Kajiked'miá.		*spoke to thee.*
	Kajikedáïá.		*spoke to him.*
	Kajikede'lia.		*spoke to ourselves.*
	Kajiked'lingia.		*spoke to us two.*
	Kajiked'bena.		*spoke to you two.*
	Kajikedpéá.		*spoke to you.*
	Kajikedkingiá		*spoke to them two.*
	Kajiked'koá.		*spoke to them.*

Examples of this construction, especially in the Imperative mood, will be given in the Vocabulary, so need not be further dwelt on here.

It is scarcely possible to reduce the verb "*to be*" to conjugation, unless we suppose the varied forms in which it is used as inflections of separate verbs, wanting in many tenses. For "*to be*" is expressed by different verbs, according to its allusion to time, a person, or a thing; and again as whether it relate to mere existence or nature of existence. In short, there is no auxiliary verb "*to be*" which can be independently conjugated. The unchangable word "minna," or "minnakana," is applicable in the present tense alone, to denote a *state* of existence, as "Eeng, um, aÿó, &c. minna, or minnakana," *I am, thou art, he is,* &c. But in past and future tenses some other verb denoting *presence,* as the verb "*to come,*" "*to reside*" &c. must be employed.

But the verb "*to be,*" when implying the *nature* of existence, can be rendered in the past and future tenses, as well as the present, by adding to the participle or adjective, *oá* in the future, and *iena* in the past, as "eeng laga akanna," *I am tired;* "eeng lagaoá," *I shall be tired;* "eeng lâgièna," *I have become tired;* "eeng rènga akanna, or renga akannaing," *I am hungry;* "eeng rengaoá or rengaoing," *I shall be hungry;* "eeng rengaièna," *I was hungry. Oá* and *iena,* it is to be remembered, are inflections of the future and past tenses in all neuter verbs.

Again the verb "*to be*" can be simply represented in the future and past tenses, when speaking of a *thing,* by the word "hobawa," *it shall or will be,* and "hobiena," *it has been;* also in the present, "hobowtanna," *it is.* This mode of expression commonly refers to the success

or accomplishment of any project. In the English idiom we should say for "hobawa" *it will do, or it will answer;* "hobiena," *it is all over,* or *has succeeded;* "hobowtanna," *it is going on.*

That boy will be a thief, could not be rendered "En koá do komboo hobawa," but "En koá do komboo oá."

Your business will be done to-morrow, not "Umma kajee gappa oá," but, "Umma kajee gappa hobawa."

This will never do, "Ka hobawa;" *go away, it is all over* "Marsenoméń hobiéna."

In English and other languages, state, nature, or condition, is rendered by affixing or prefixing the various tenses of the verb "*to be*" to the adjective, as to be hungry, *I am hungry, I was hungry;* "*to be glad, I am glad, &c. &c.*" But in the Ho dialect the adjective itself becomes a neuter verb, and is conjugated by affixing to it the different inflections denoting time and mood—*to be hungry,* "rengatéá;" *I am hungry,* "renga akannaïng;" *I was hungry,* "rengaiénaïng;" &c.

Neuter Verbs.

After what has been said, it would be unnecessary to give any example of the conjugation of neuter verbs. It only requires to be remembered that their present terminal is "akanna" instead of "tanna;" and their past inflection "iĕna," instead of "kidda, tadda, lidda, or eea," all of which latter are transitive forms.

Some verbs are both neutral and transitive, as "Chabateá" *to finish.* They have therefore both inflections. In the transitive form "Chabatea" is frequently added to the root of some other verb, to denote completion; but it may also be used alone: in the neuter form, it is of course confined to the third person.

Examples.

Yōmchabakiddaí, *He eat it all up.*
Bȳchabakidallé, *We finished (making) it.*
Kajeechabȳmén, *Finish speaking.*
Gappa miang chabawa, *It will be done to-morrow or next day.*
Nádo chabiéna, *It is now finished.*

The word "Hereá" is placed between the root and terminal of a verb to denote positiveness or certainty; as when the speaker means

to state something as an incontrovertible fact, as, "Kajee hereákiddaï," *most assuredly he spoke.* "Oodoob hereámén," *speak positively.*

The causal form is rendered by putting "chee" between the root and terminal—as "landateá," *to laugh,* makes "landacheeteá" *to cause to laugh;* "aïoomtea," *to hear,* "aïoomcheetea," *to cause to hear,* as in Hindustani *á* is inserted (with a few exceptions) for the same purpose, as Hunsna, Hunsána; Soonna, Soonána, &c.

Continuity (in the Imperative mood alone) is expressed by adding "akán" to the root, as "doobmén" *sit down,* "doobakánmen," *remain sitting;* "Aïoom mén," *listen,* "Aïoomakánmén," *continue listening.*

Finally, the thoroughly performing an act, is often rendered by adding the verb, "jōmeteá," *to eat,* to the root of the expletive verb, as "neljoomkidallé," *we all saw it (thoroughly);* "aïoomjōmmén," *listen (attentively);* "Geetee jōm-meén," *sleep (soundly).* And should the verb be of a violent nature (referring to some violent act) the particle "táb" between the root and inflection gives force to the meaning, as "Goïtab kiddaï," *he slew him (outright);* "Toltab kidallé," *we bound him* (forthwith); "Neertabmén," *Run (quickly) fly!* so "Ooiteá" is *to jump,* and "Ooitabtea," *to bound (as a tiger.)*

Ká before the pronoun gives the verb a negative form, as has been before explained in describing the Imperative mood.

There is no verb "*to have,*" possession being denoted in the same manner as in Hindustani, *I have,* "Eengtra minna"—"Méré pas hȳe."

From the foregoing remarks may be gathered, that in the active or transitive voice

The present terminal is, "*Tanna.*"
The past, "*Kidda, tadda, lidda, kenna* or *keea.*"

In the Neuter Voice.

The present terminal is, "*akênna.*"
The past, "*ièna* or *lèna;*"

In Either Voice.

The conditional, subjunctive, or potential mood terminate in } "*redo*" or "*kedrado,*"

all these terminals being of course subject to the inflections of their pronouns, which are, as has been said, as often affixed as prefixed.

A nondescript species of Verb is used in rendering the sentence "*what shall or can, I, (thou, he, &c.) do ?*"

Future and Present.

Ch'eeng chikya,	*what shall or can*	*I,*	*do ?*
Chee'm chikya,		*Thou,*	
Chee chikya,		*He,*	
Cheeboo chikya,		*We all,*	
Chee'lé chikya,		*We,*	
Chee'pé chikya,		*You,*	
Chee'ben chikya,		*You two,*	
Chee'ko chikya,		*They,*	
Chee'king chikya,		*They two,*	
Chee'ling chikya,		*We two,*	

Past tense.

Chee'ng chikakidda, *what could I have done ?* &c. &c. &c.

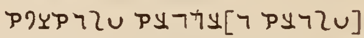
The verb "*to be able*" is rendered by "Dytea" in its moods and tenses, as, "Niádo eeng bydya," *I can make this ;* "Umdokadya," *you cannot ;* "K'áï dyoá," *he will not be able.*

Many little exceptions and variations occur to these general rules, which it would be impossible to become familiar with, without constant practice in their arbitrary use ; but the foregoing remarks comprise all that would be of practical utility. The constant elision and confluence of words beginning and ending with vowels must be remembered, and that the particle *do,* has no meaning whatever. This will render the examples above given to the different rules simple and illustrative.

Note.—The Vocabulary, and Dialogues in the Ho language will be published in No. 107. I have had 50 copies extra of the Grammatical construction, Vocabulary, and Dialogues of the Ho language struck off, and shall be happy to distribute them (gratis) to parties desiring to have them.

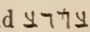
NOTE, *to be appended to my account of the coins of Mayas, in the article on "Some New Bactrian Coins," No.* 105.

In the Journal of the Asiatic Society, vol. iv. plate 21, No. 4, there is a sketch of a square copper coin of large size, which Mr. James Prinsep attributed to Antimachus. M. Jacquet (Jour. Asiatique, February 1836, p. 170, No. 48,) thought that it belonged either to Lysias or to Philoxenes; and M. Raoul-Rochette (J. des S. March 1836, p. 131, note 2,) recognized it as a coin of Philoxenes, from its native legend. The coin, however appears to me to belong to Mayas; the Bactrian Pali legend being plainly



[*Maharajasa ra*] *jatirájasa mahatasa Máasa.*

"[Coin of the great king, the king] of kings, the mighty Mayas;" and from this the Greek legend is readily completed—ΒΑΣΙΛΕΩΣ ΒΑΣΙΛΕΩΝ ΜΕΓΑΛΟΥ ΜΑΥΟΥ.

Dr. Chapman possesses a duplicate of this coin, which has ΑΣΙΛΕΩΣ ΒΑΣΙΛ .... ΑΥΟ, on the obverse; and  ... [*ra*] *jatiraja* [*sa*], on the reverse.

It is a curious fact, that the copper coins of the earlier Bactrian princes are, in comparison to the silver coins, extremely scarce. Thus of Euthydemus there are but a few copper pieces known, and all of one single type. Of Demetrius there are, I believe, but two copper coins yet known, both of which are in the possession of Captain Hay, and I hope shortly to make them public. Of Antimachus not a single specimen has yet been found to my knowledge, and yet his silver coins are moderately common.

A. CUNNINGHAM.

This note to Lieut. A. Cunningham's interesting paper, published in my last number, reached me after the sheets had been struck off.

A Third Memoir with reference to the Theory of the Law of Storms in India; being, Researches *relating to the Hurricane in the Bay of Bengal, and at Cuttack, from 27th April to 1st May* 1840.—*By* Henry Piddington, Esq.

On the 30*th April* the station of Pooree (or Juggernauth) in Cuttack, was visited by an awful Hurricane, which destroyed almost every house, Native and European. It was subsequently learnt by the arrival of the ship Nusserath Shaw, with troops on board, dismasted, that several of the ships of the China expedition, which had sailed a short time previous, had suffered, and that the storm had extended across the Bay from near the Andaman Islands, if not to the eastward of them, in about a NW. direction to Pooree. It seems also to have travelled as far as Kurnaul, inland.

Our documents for the investigation of the track of this storm, amount to about thirty logs and reports of different kinds, the which, preserving always the expressions of the writers in all that is essential, I have abridged into as small a compass as possible; and I have, as before, condensed the whole into a table at noon; giving thus a view of the contrasts which the weather presents in different parts of the Bay, at nearly the same moment of time, the difference of Longitude being too small to require any correction of moment. I regret not having been able to add to this Memoir the logs of several of the ships of the expedition, such as the Marion, Isabella Robertson, and others; but as they have not been forwarded to me, I have thought the delay not worth incurring, as it is not possible to say when they may return to this port. Our evidence for the track of the storm will, I hope, be found tolerably complete, from its centre having on different days passed over, or close to, five ships, and to one station on shore. We are thus enabled to mark its route with greater exactness, for a longer time, and to a greater distance, than any of the preceding ones hitherto investigated. As in the foregoing Memoirs the logs and tables are followed by a summary view, stating the grounds upon which the track of the storm, the size of the vortex, and its rate of motion are laid down. The general reader, to whom the professional details are tedious, will find her I trust that nothing has been assumed without due amount of proof. The seaman can judge for himself.

Extract from the Log of the Ship "Nusserath Shaw," Capt. Edwards, bound from Calcutta to Singapore and China, with troops on board. Reduced to Civil time.

27*th April*, 1840. At midnight, light airs and fine, hot, sultry weather; wind SEbS.; at 4 A.M. EbN.; at 8, increasing; and at noon frequent hard squalls. Lat. Obs. 16° 2′ N. Long. Chron. 91° 21′ E. P.M. strong breezes ENE. to midnight, with dark cloudy weather and increasing sea.

28*th April.* Wind ENE. to noon. 7 A.M. lost maintopsail. 9 A.M. increasing gale; lost fore and main topgallant mast and head of main topmast. 10, gale increasing; lost mizen mast, boats, &c. At 11, heavy white squall. Noon, blowing a perfect hurricane; three guns lost overboard; no one able to go aloft. From 7 A.M. lying to under bare poles, with wind to the SE. Noon, Lat. account 14° 26′ 23″ N. Long. 91° 34′ E. P.M. blowing a hurricane; all the hatches battened down. Wind ENE. At 3 P.M. it shifted suddenly round to SW., laying the vessel gunnel under, with sea awfully high. Midnight, the same, and frequent squalls; vessel a perfect wreck, with all the braces, &c. gone.

29*th April.* From midnight lying to. 1 A.M. wind SSW. Noon, squally and rain. Lat. Obs. 15° 23′ N., Long. 90° 31′ E. Wind SbW. P.M. fresh gales and heavy weather, with dreadful heavy gusts of wind and squalls; sea breaking over the ship; 3½ feet water in the hold. At 8, weather as before. Midnight, less wind and sea, but ship labouring dreadfully; lying to throughout, with wind to the westward.

30*th April.* 1 A.M. Ship rolling dreadfully; still lying to. At 4, very squally, and fresh gales, with dark cloudy weather. Noon, Lat. 15° 31′ N. Long. 90° 11′ E. P.M. fresh gales with a heavy cross sea; wind SE.; bore up for Calcutta.

Extract from the Barque "Tenasserim's" Log Book, by Capt. T. Tapley, bound from Calcutta to Rangoon. Reduced to Civil time.

27*th April*, 1840. First part, light variable winds from the SSE. and suddenly shifting ENE. Midnight calm, sea smooth; last part of part of this day, strong fresh breeze eastward, smooth water.

Long. Chron. Noon,... ... ... 91° 50′ E.
Lat. Obs. ... ... 17° 40′ N.

Noon. This day cloudy; wind from the eastward; about a seven and eight knot breeze.

1. P.M. Strong breezes eastward, cloudy sky, and unsettled weather. Sunset, strong breezes and cloudy, with a threatening appearance to the eastward. At 8, made the ship snug. Midnight strong breezes from EbS½S., with a very threatening appearance; breeze gradually increasing, and coming in strong gusts and squalls.

28*th April.*—At 4 A.M. weather more threatening and a heavy sea getting up from the eastward. Daylight, wind SE. having every appearance of a gale, and blowing very hard, made all snug for bad weather. At 8, blowing a severe gale; sea at this time tremendous, battened a double tarpaulin fore and aft. Sea making a continual breach over the ship, and blowing very hard. Noon, heavy gale, ship labouring much, was obliged to keep

the close-reefed topsail on her, owing to the heavy weather lurches; sea making a continued roll over the vessel; gale increasing. Sun obscured. During the whole of this twenty-four hours ship was sailing to the southward. P. M. heavy gale from SE. and varying to SSE. with a terrific sea on making a awful breach over the ship; going 2½ knots through the water up to 4 A.M. Course SbW. to SW. From 4 A.M. to noon, ship's head to NE. and ENE.; having wore round. Carried away one of the channel plates. Midnight ship rolling heavy, taking the sea in on both sides.

29*th April*, 4 A.M. Wind a little more moderate, but sea still continuing the same. Set reefed foresail to steady the ship. Noon rather clear, but gale still blowing hard. Wind SE.

Lat. Obs. Noon, ... 16° 32′ N.
Long. Obs. Noon, ... 91° 02′ E.

At 9, a brig passed, scudding under a foresail only, with topgallant mast on deck. 1 P.M. up foresail; a very threatening appearance to the southward. At 2-30, *wore ship to the SW., at the same time, to clear a whirlwind. By this manœuvre allowed the whirlwind to pass about* 200 *yards on the lee quarter; at this time blowing a perfect hurricane.* Wind SSE. and S. Furled every thing to a storm main trysail, and hove the ship to; torrents of rain; sea making a constant breach over the ship. At 5 P.M. more moderate; set the close-reefed topsails, and at 10-30, wore ship to the ESE. Sea still continued high, and a cross head sea, owing to shift of wind in the whirlwind.

30*th April*. Daylight, more moderate. Wind SSE. Wore round to the SW.; sea still running high and confused. A.M. weather clearing up a little.

Noon Obs., Lat. ... ... 16° 21′ N.
Ditto Long. ... ... 91° 50′ E.

Noon, moderate.

The phænomenon which Capt. Tapley describes in the log of the 29th, and which I have printed in italics, I thought so extraordinary that I requested of him a more particular account of it, and the following is his very graphic description of this awful addition to the fury of a tempest, which is, I believe, quite new in our naval records. A whirlwind coming down upon a vessel, lying to, in the midst of a hurricane, must, one would think, carry inevitable destruction with it,* should it fall upon her. The Freak seems to have lost her foremast in one, as will be seen by her log. Capt. Tapley says, "I have much pleasure in giving you answers to your inquiries, as nearly as I can. At 1 P.M. 30*th April*, by Nautical time, (but by Civil time the 29th,) a very threatening appearance to the Southward; ship's head east, a terrific squall from the SSE. rising very

* Col. Reid refers to an instance of this kind, but I cannot now find the passage again.—H. P.

rapidly, and having a very blowing appearance. When the squall was within 2 miles of the ship, perceived a heaving whirlwind flying to the NNW.; immediately wore ship to the SW., or first to the westward, to give the ship way through the water; by doing so, allowed the whirlwind to pass the ship; when passed, brought the ship to the wind, clued every thing up, and furled all. Soon after, about 10 minutes, the squall took the ship from the SSE. Ship's head about SW., blowing a complete hurricane, could not see half the length of the vessel on the water, owing to the tops of the sea being blown by the force of the wind, and a deluge of rain at the same time. I cannot remember *how** it was turning, *as we were anxious to turn out of it;* it was going round at a furious rate, and disappeared in the rain to the NNW. I do not recollect any lightning at the time.† We could not discern it until it had approached pretty close, and then the most we saw was the foaming of the water travelling up in a rapid progress. The day had been fine and a little clear for a few hours, but blowing hard. At the time this squall appeared, the sky all round assumed a threatening appearance, and squalls gathered and rose rapidly. After this severe squall, the weather kept bad during the remainder of the 24 hours."

Extract from the Log of the Barque "Amelia Thompson" from Penang, towards Madras.

Monday, 27*th April*, 1840. Civil time. P.M. Strong breezes, with heavy squalls of wind and rain.

Wind. West.

A.M. Hard gales with rain.

8 A.M. More moderate.

Noon. Moderate and fine.

Bar. 29·55—Lat. Obs. 4° 14′ N. Long. 88° 18′ E.

West. P.M. Strong breezes and squally.

WbS. 8 P.M. Heavy squalls with rain.

WSW. WbN. 8-30. Wind veered to the WNW; wore ship to WSW.

Tuesday, 28*th April*, 1840. A.M. Ditto, weather at daylight more moderate.

West.

WSW. Noon. Moderate weather.

Lat Obs. 4° 25′ N. Long. 87° 48′ E.

The Barque "Clarissa" from Penang to Madras experienced no bad weather until the 28*th of April*, 1840. At noon on that day, she was in 7° 1′ N. and 87° 56′ E.; it had been blowing hard from West to WSW. in squalls,

* † These are replies to my queries.—H. P.

with rain and a high sea, but did not approach to a gale. On the 29*th*, the weather became moderate, the swell high and confused.

The Barque "Ganges" from Malacca to Madras. On the 26*th of April*, 1840, in 6° 37′ N and 95° 56′ E. a fresh gale commenced at SSW. veering to the SW. On the 27*th* she hove to under storm staysails; the Barometer fell to 29·50, blowing a hard gale from SSW. to SW. At noon, still lying to in Lat 7° 10′ N. 95° 18′ E. Bar. 29·60. On the 28*th* the gale abated, and at noon the weather cleared up. Lat 8° 7′ N. 94° 33′ E. Bar. 29·80.

Extract from the Log of the Brig "Freak," from Calcutta to Singapore; communicated by Captain Smoult. Reduced to Civil time.

19*th April*, 1840.—Left the Pilot at the Sand Heads, and carried the wind about SSW., standing to S. Eastward. The wind then became light, and veered from SSE. to SW.; the weather continued light and variable with flashes of lightning, in the north after sunset. On the 20*th*, Lat. 20° 31′ N. Long. 88° 35′ E. On the 26*th*, Lat. 19° 23′ N. Long. 88° 40′ E. light winds, between SW. and South, with strong northerly currents until 27*th*, when the wind hauled round to the East. Lat. 18° 56′ N. Long. 88° 30′ E. P.M. Moderate breeze with fine clear weather. At 8, the wind increased, and weather became cloudy and threatening, which obliged us to take in all steering sails; the wind *moderated at midnight;* set the steering sails.

28*th April*. At 10 A.M. the breeze freshened again, took in all steering sails and royals, the Barometer standing about 29·30 steady. Lat. 17° 40′ N. Long. 88° 32′ E. P.M. strong breeze and threatening weather, *the Barometer vibrating very much*,* dark heavy clouds rising in the north, wearing the appearance of ragged edges.

Commenced making preparation for a gale of wind by sending down the lofty yards, and securing spars, hatchways, boats, &c. and double gasketting the sails as we furled them. At 6. P.M. we had got every sail stowed, except the close-reefed fore topsail, the gale increasing so rapidly from NNE. that it obliged us to stow the main topsail, without reefing; the sea rising in proportion. The wind gradually veered round to the north, and blew from that quarter till midnight, (Lat. Acc. 15° 46′ N. Long. 88° 18′ East) when the wind chopped round to the NW. suddenly, and blew with double force, which threw the ship on her broadside; the helm was immediately placed a-weather, but was rendered useless, owing to the position of the ship. She lay dormant for some time, the

* The italics are mine. This *vibrating* of the Barometer is frequently noticed in the Logs in Col. Reid's work, and seems an infallible sign. In Professor Barlow's account of the water barometer it is particularly noticed as "resembling the breathings of some huge animal."—H. P.

tempest roaring with great fury, and sea flying over us in foam. The lightning mingling gave it the appearance of fire and water; the roaring of the wind prevented us distinguishing whether it thundered or not. We were soon enabled to brace the fore yard forward, which in a trough of a sea wore her before the wind, heading per compass SE. by E. directly in the trough of a tremendous sea, knocked up by the wind from North, which rendered our position most dangerous, as every sea appeared coming on board; in a short time she broached to, with her head north. The wind veering to the westward, and blowing with great fury, the ship was again thrown on her side, but being head to sea, lay much easier (the Barometer sunk to 27·25 in the gale). The foam flying so thick as to extinguish every object except at intervals; a supposed break in the sky afterwards proved to be the top of the sea!

29*th April.* About one in the morning, a sudden and awful gust of wind carried away the foremast. It was accompanied with a vivid flash of lightning, which enabled us to see the mast and yards carried up in the air, as if in a whirlwind, and then fall on deck with such violence that the fore yard arm stove in the fore hatchway, and went chock over into the weather wing of the ship, leaving the other arm extended to leeward. To this the wreck of the mast and other yards were attached, acting as a lever on the ship, keeping her side down. It remained thus the rest of the night, in spite of all our endeavours to cut and clear it away from the ship. The furled sails blew away by piece-meal; the quarter boat filled with water and broke away; heavy seas breaking on board, and the darkness so intense, that we could not see a yard before us; the water rushing down the hatchways, against all precaution, carried away the larboard bulwark and several stanchions, did the round house much injury, and every thing in its way; we found much difficulty in getting the crew to the pumps. Found a great quantity of water in the hold; considered it prudent to throw over some of the cargo in order to lighten the ship, as the water forced down the fore hatchway in great quantities. The wreck of the masts aft beating about in a most fearful manner, endangering the main mast, the only spar we had to work the ship with in running down to the Sand Heads. At daylight, wind SW.; the crew kept constantly at the pumps. Barometer rising very slowly, being at 27·30. Noon, sun obscure, Lat. account 16° 2′ N. Long. 88° 36′ E. P.M. wind SW. still blowing furiously, and ship labouring heavily, shipping water over all; showers of rain at intervals, hands kept constantly at the pumps, and clearing away the wreck. The same weather throughout.

30*th April.* At daylight loosed the peak of the main sail, hoisted it up a few feet, and hoisted the foretopmast staysail to the throat halliards,

in order to keep her to the wind; this soon blew away, together with a spare jib, which was hoisted to the main stay. Constantly employed pumping. Noon a little more moderate. Lat. account 16° 41′ N. Long. 88° 0′ E., cut away the wreck from the jib-boom, which was sprung, bent a spare foresail to the mainyard and set it; got a preventer main topmast stay up, and otherwise repaired damages. Bore up for Calcutta.

1*st May*. Midnight squally with rain and thick cloudy weather, at daylight people employed setting up rigging, &c. and getting up a main topsail. Noon moderate breeze with passing clouds. Lat. Obs. 17° 26′ N. Long. 87° 47′ E. Barometer 28·30.

May 4th. At 4. P.M. got a pilot. During this gale, and previous to it, the following phœnomenon manifested itself; that of the clouds rising rapidly in the north, appearing ragged and black, with white feathery edges, and stretching to the southward in long tails; the sea becoming tumultuous in, and as soon as the gale reached us the atmosphere becoming very sultry. Barometer stood at noon about 29.30, or about the standard height previous to the gale, and now in Calcutta, about 29·20.*

Extract from the Log of the Brig "Vectis," R. Isemonger, Commander, bound from Calcutta to the Cape. Reduced to Civil time.

28*th April*.—At noon, fresh breezes east, and cloudy. Lat. 18° 37′ N. Long. 87° 55′E. Standing south, going 6 knots. P.M. strong breezes; dull hazy weather. At 8 P.M. preparing for bad weather. Midnight, wind ENE. blowing a gale; head SbW.

29*th April*.—1 A.M. Increasing gale, scudded; and at 6 A.M. hove to under bare poles. At 7 A.M. full hurricane and heavy sea; lost jibboom; shipped a heavy sea, which hove the vessel on her beam ends, and cleared the deck, bulwarks, &c.: Cut away the topmasts. Noon, the same weather, wind marked as *variable*†, Lat. 16° 58′ N. Long. 88° 4′ E. At 2 P.M. began to moderate. Wind marked as veering to the Northward, then to the Westward. At 8 P.M. it stood at SSW. 2 feet water in the well.

30*th April*.—A.M. to Noon, heavy cross sea. Lat. 17° 40′ N. Long. 88° 10′ E. Wind SbW. Gale continuing, and very high sea.

* It is due to Captain Smoult to say, that this very valuable account of the storm was accompanied with a capital MSS. chart, on which the vessel's track was accurately laid down.—H.P.

† In the confusion of a small vessel on her beam ends it is probable no one could say how the wind was for some hours; or it might have been veering rapidly, and is thus marked variable.

1*st May.*—4 A.M. more moderate, but heavy squalls with rain. Wind SbW. Noon Lat. 18° 43′ N. Long. 88° 18′ E. Wind SSW. fresh gales and squally, bore up for Calcutta.

2*nd May.*—Noon Lat. 19° 54′ N. Long. 88° 29′ E.

" George and Mary;" Captain Golightly.

An imperfect account of the weather experienced by the "George and Mary," Captain Golightly, states, that upon the 28*th April* at Noon, the wind veered from SW. to East with a fine steady breeze, to which all sails were set. At 6 P.M. it became cloudy, with a heavy bank to the NW. The wind shortly after shifted to North in a very heavy squall, lasting for three-quarters of an hour, to which every thing was let go, and the vessel was than prepared for bad weather. The wind continued to veer to the NW. and at daylight of the 29*th*, had increased in violence. At noon of the 29*th*, Lat. was *about* 16° N. Long. 84° 30′ E.* the gale being at its height, and blowing a severe hurricane from the NNW. which lasted for six hours; the wind then veered to the East, then to ESE., to S. and SSW. and at daylight on the 30*th* began to moderate, leaving a "nasty cross sea."

Extract from the Log of the Barque "Flowers of Ugie" from Calcutta to the Mauritius. Reduced to Civil time.

27*th April*, 1840.—At noon in Lat. 19° 52′ N. Long. 89° 24′ E. at which time and till midnight, fine clear weather. Wind SE., standing to the southward.

28*th April.*—At noon smart breeze ESE. and clear. Lat. 19° 19′ N. Long. 88° 22′ E. 3 P.M. Bar. 29·17, breeze increasing fast from ESE. veering to East at 7 P.M. At 6, very bad appearance to the SE., reduced sail. Midnight, strong gales; Bar. 29·11. Ship going 5 knots, and standing to the SW.

29*th April.*—At 4 A.M. squally with rain. At 7, Bar. 28·19. At 9, gale increasing, furled every thing. At 11, very heavy gales, with heavy rain and dark gloomy weather; hove the ship to on the larboard tack, under bare poles, wind being at NE. at 10; and North at 11. Very heavy sea breaking on board, and sweeping every thing away. Noon very bad weather, vessel straining much, and making much water. Bar 28·15. From

* This is apparently a rough guess from memory, the account being written at the Captain's request by an assistant of the house to which he was consigned, the log book being on board the ship, and the ship on its way down the river.

midnight to 11 A.M., she had run 76 miles SWbS½S. Lat. 17° 15′ N. Long. 86° 43′ E. by acct. at noon. P.M. Gale still increasing, with a very heavy sea, and vessel lying nearly on her beam ends, so much so, that the pumps would not suck water. Wind NW. at 1 P.M. Bar. 28·36; At 3 P.M. wind West. At 5, SW. At 8 South, at which it continued till midnight. Bar. at 7 P.M. 28·41; at midnight 28·19. At 4 P.M. tremendous gales, with heavy rain and gloomy weather; at midnight gale abating a little.

30*th April.*—6 A.M. more moderate, but at noon very heavy gales and bad weather, Lat. 17° 48′ N. Long. 86° 53′ E. Bar. 29.11. P.M. Strong gales and cloudy; saw a vessel standing to the northward with loss of foremast and mizen mast. At 9, Noon, moderate, with lightning to the NW. Wind South till midnight,, vessel lying to, head West.

1*st May.*—Midnight cloudy weather, wind South till noon, when moderate with fine weather, Lat. 18° 23′ N. Long. 86° 58′ by Acct.

2*nd. May.*—At noon in Lat. 18° 44′ N. Long. 88° 6′ East.*

Extract from the Log Book of the Ship "La Belle Alliance," Capt. Arkcoll; from Madras to Calcutta. Reduced to Civil time.

29*th April*, 1840.—Midnight; moderate breezes and squally, latter part a fresh gale with hard squalls and showers of rain.

28*th.* At 3 P.M. the Lighthouse on False Point NWbN, at 4, the lighthouse WbN; at 5-30 tacked to the SE; at 6, the Lighthouse WbS½S. and the land at WbN. At midnight tacked to the Northward; at 3-30 A.M. tacked to the E; at 5, the light WNW. At daylight, an increasing breeze from NE. and squally. At Noon an increasing gale with hard squalls, distance on the log 71 miles. Lat. Obs. none. P.M. A strong gale with hard squalls and thick hazy weather; latterly an increasing gale with violent gusts of wind. At Midnight a violent gale, with violent gusts of wind.

30*th April.*—1 A.M. to 5 A.M. The gale increasing, with violent gusts of wind and heavy rain; furled topsails; ship laying to under storm main staysail. At 6 A.M. ship plunging deep, with a heavy confused sea; carried away the flying jibboom; cut away the wreck. At 8 A.M. trying to strike topgallant masts; ship laying over and plunging deep could not, and obliged to cut away fore and main topgallant masts to save the topmasts; in so doing the head of the foretopmast broke above the rigging;

* Bar. of the ship "Flowers of Ugie" at noon, 18th August in Calcutta at ten A.M. was .. .. 29·45
The Barometer at the Surveyor General's Office. .. .. 29·56

Difference to add. .. .. 0·11
This correction has been made to the Bar. heights given in the log.

a heavy confused sea. At 9 A.M. *a sudden calm*, struck main topgallant mast; ship labouring much, from the heavy sea. At 10, a violent gale from SSW. with most awful gusts of wind and heavy rain, the ship laying to under storm main staysail. At noon, gale continuing with equal violence. P.M. A violent gale, with awful gusts of wind, and a heavy sea. Moderating after midnight, with thick hazy weather. At 1 P.M. in a sudden gust of wind and rain, the storm main staysail blew away, the ship lying to under bare poles; heavy and violent gusts of wind and rain, during the day. At 2 P.M. in a heavy gust of wind, the ship labouring much, the starboard boat's davit gave way. Cut away the boat to clear wreck.—Ship lying to under bare poles. Violent gusts of wind from SSW. with heavy rain and thick hazy weather during the night.

1*st May*. At 5 A.M. the weather moderating, set close-reefed topsails. At noon the weather moderating and the sea going down; thick hazy weather.

30*th April*,	10	P.M.	Bar. 29·40
	12	.....	..... 29·20
	3	A.M.	..... 29·00
	5	.....	..... 28·10
	8	.....	..... 28·30
	12	.....	..... 28·60
1*st May*,	4	P.M.	..... 28·90
	9	.....	..... 29·10
	12	.....	..... 29·30

Lat. Obs. 19·19 N.

The first of the gale was from the NE., and at 11 A.M. on the 30*th*, it suddenly shifted to the southward, and blew if any thing heavier than before.

I am indebted for this extract, which is so highly interesting, as marking the direct trask of the storm towards Pooree (Juggernauth) to Capt. Biden, Master Attendant of Madras, but I could not obtain a sight of the ship's log while at Calcutta; so that her exact position at the time of the shift of wind, is not so certain as it might have been; neither could I obtain a comparison from her Barometer.

Abstract of the Log of the ship "Christopher Rawson," Capt. Smellie. Reduced to Civil time.

On the 27th, exchanged numbers with the Marion, Capt. Pope, in Lat. 17° 15′ 30″. N. *Bar.* 29·80; the Bar. down 4 lines, and the weather very oppressive. Light SSE. winds and sultry. Barometer falling fast.

28*th April.* Midnight, heavy gathering clouds in the SE. and threatening look. At 10 A.M. a very heavy squall from East; I consider this the commencement of the gale; the scud flying in confused masses, and a number of sand birds on the rigging. At noon, heavy appearance of weather. Lat. Obs. 19° 29′ 15″ N. Bar. 29·40. P.M. Blowing fresh from E. and ESE., the Barometer 29·35, and every appearance of worse weather; making a bold push for the Pilot. Midnight and until day-dawn, constant heavy squalls and much heavy rain.

29*th April.* At 4 A.M. sounded in 17 fathoms; at 5 sounded in 10 fathoms, and by two excellent Chronometers made the Outer Floating Light bear from us due west 15 miles distant; finding the sea too high to receive a pilot close-reefed the top sails and courses; under this sail stood out South; wind abeam at East, gale increasing and the sea rising fast. At 10 A.M. *a tremendous sea spread from the SSW.* and a heavy ground swell on our beam East; preparing for bad weather. At noon gale very heavy, no sun, suppose ourselves SSW. from the Floating Light, distant 30 miles.

Gale increasing at ESE. and East in the heavy squalls; a very high confused sea often breaking over all. At midnight sprung fore yard; sounded in 30 fathoms.

30*th April.* 2 A.M. Blowing a hurricane, sprung our main mast in the deck partners; the sea washing away our large cutter, davits and all, and making a clear breach over all; both pumps going. The wind SE. and veering round gradually to the southward. At day-dawn observed some broken spars and short pieces of plank passing us; shipped a heavy sea, broke the lashings of the skylight, which unshipped, and nearly filled our cabin with water. Noon., Lat. Obs. 20° 28′ N. A heavy sea struck the ship aft, and injured our rudder head. Bar. 28·80.

Bar. 28·90; gale continues heavy; ship under bare poles, lying in the trough of the sea, very uneasy. Wind SSE., ship's head SWbW. Having blown our storm staysails away got a bolt of new canvas in the mizen rigging.

1*st May.* At day-dawn ship on her beam ends, and the sea making a fair breach over all; the water much discoloured; sounded in 16 fathoms on the edge of Point Palmiras Reef, the wind suddenly shifting into the SSW. wore ship to the SE. Sun obscured at Noon; no vessels in sight.

Some attempts at a clear-up; ship lying helpless in the trough of the sea; Bar. rose 4 lines. At 2 P.M. set the close-reefed topsails. Sunset clear weather, but destructive sea, midnight heavy squalls from SW.

2*nd May.* Day-dawn, moderating fast. Out reefs, and stood to the WNW. At 7 sighted a Pilot vessel. At 8° 30′ obtained a pilot. From our position on the commencement of the gale, I supposed myself in the centre of the Bay

during the worst part of it, and allowed 36 hours drift under bare poles before I looked for shoal water. My astonishment was great at finding the ship, early on the 1st, in 16 fathoms on the reef; and I can only account for it by supposing the easterly gale had caused a current, or set, to the westward of at least 4 miles per hour; which may perhaps account for so many vessels getting over on the Point, as I had the advantage of 15 miles easting at its commencement.

Balasore.

A letter from Balasore, dated 4th inst., says:—

"We have just escaped a severe hurricane; it blew very hard on the night of the 30*th*, and the tide rose very high, but luckily the wind did not last long enough to drive the sea over the country. At Pooree they have felt the hurricane most severely. I hear that all the houses and the Government Cutcheries have been blown to the ground, and much damage has been sustained; great part of the native town has been destroyed, and several lives lost. When the circuit house fell, two men were buried, and escaped with broken legs. Pooree is full now, the gents from Cuttack having gone there to enjoy the cool breeze; they and the residents took refuge in the only house which stood the storm: the description of the scene is fearful. Mr. Ewart lost his Arab horse, buried in the ruins of the stable. The natives declare that Juggernauth's august presence alone prevented the sea from washing away the town. The storm was felt at Cuttack also severely, and I much fear it has been destructive on the whole line of coast. This is a true version I think, and you may perhaps like to give the readers of the *Englishman* the news."—*Englishman, 7th May*, 1840.

Report from Captain A. Bond, Master Attendant, Balasore.

29*th April*, ...	Bar.	29.66	Ther.	85°	NE. Rain and squally,
30*th Ditto*, ditto, ...		29.57	ditto,	82	NE. Rain and puffy,
1*st May*, ditto, 8 A.M.		29.25	ditto,	81	E. Strong gusts of wind,
Ditto, 1 P.M.		29.43	ditto,	82	NE. and East.

On the 1*st May*, A.M.; at Balasore; strong gusts of wind, with continual rain, inclining to a gale till 8 A.M., when the wind veered from NE. to South, and cleared up at SW. at 9 A.M.

At Budruck, 32 miles WSW. of Balasore, the wind stronger, with flying clouds to the SW.

I was at Budruck on the morning of the gale, and from the log kept here, it was very similar to the one I kept there, in every respect.

The strength of the gale was felt more southerly at Pooree; and inland the rain appears to have been heavier, and the wind less.

The May gales have not affectd Balasore since May 1823. No vessels lost on the coast; several put into Chooramoon in distress.

A. Bond.

I am indebted for the following letter to Mr. Ewart, Magistrate of Pooree.

Your letter to Mr. Cumberland has been handed to me. During the storm, and for some weeks, Mr. Cumberland had been very unwell, and had ceased to keep a Meteorological Register. At the time of the storm, I and two other gentlemen were staying at our house. On comparing notes next day, we discovered that we differed in one material point, viz. which way the storm went round.

To the best of my remembrance, the South-west wind, which generally blows so steadily during part of February, March, April, May, and part of June, failed and became variable, hanging between South and East. The sky was very cloudy, and on Wednesday, 29th April, there were showers. On Wednesday afternoon the wind was very strong from NbE.; the rain and wind continued to increase during the night from ENE. On Thursday morning, 30*th April*, at daylight, it was blowing strong, but people went about their ordinary avocations. By 10 A.M. there was a gale from NE. At noon I went on my elephant to visit the various ladies who had come with their families, but without their husbands. The wind was so violent and gusty, that I found it necessary to hold fast by the pad-ropes, and the drifting rain and sand frequently made the elephant stand, and refuse to proceed. From 8 A.M. on Thursday, 30*th*, the rain was incessant. The wind continued to blow, with about the same violence, after 10 A.M. till evening from the North-east. It then veered to nearly North, and after hanging between N. and NE., at about 7½ P.M. *entirely lulled.* About 8, what we imagined the ordinary monsoon breeze began to blow from SW.; it however increased, and got round to nearer the West. By 9½ P.M. it blew from WSW. with far greater violence than it had from the other direction. Many houses had lost a portion of the thatch by the NE. wind, but almost all were destroyed by the West wind. It began to abate about 4 A.M. on Friday 1*st. May;* there were occasional gusts during the morning from SW., but our usual breeze blew pretty regularly; my impression was, that just before the lull on Thursday evening the wind was at NW. and went by the East to SW. This struck me particularly, because it was contrary to the received theory.

I fear this is a very vague account, but it is the best I can give.

Pooree,
30*th May*, 1840.

James K. Ewart.

Note.—It will readily be seen by those to whom the Theory of Storms is familiar, that the centre of the hurricane, as here described, must have passed over, or a very short distance to the South of the station. The discrepancy of opinions mentioned might easily occur at such a time, amongst gentlemen who were not seamen, and it is more than probable, that, at the centres of storms and near them, counter currents and eddies do occur; and that their changes are almost instantaneous; the main change was from about NNE. to SW. and at the centre this might have happened either way, without affecting the truth of the theory. H. P.

The Great Storm in Orissa.

[*From a Correspondent at Pooree.*]

"On Thursday, the 30*th April*, one of the most violent storms ever remembered in Orissa visited the station of Pooree, and surrounding district. The wind blew very fresh from the North-east early in the morning, and towards the middle of the day increased so much, as to make every one take precautions to guard against its violence. The surf was unusually high and roaring, and approached the bungalows much nearer than was at all pleasant. Out-offices were levelled, and clouds of sand buried every thing. About 6 o'clock in the evening the wind lulled, when it was hoped that the worst was over, but the disasters of the day were as nothing in comparison with what the night brought. The wind suddenly shifted round to West and South-west, and recommenced in all its fury. Every one sat waiting for the worst, running from one room to another, as the house gave way, and when the general crash came, it was fearful.—The wind and rain so boisterous, that no one could stand erect exposed to them. Ladies then escaped to their palkees, anxiously awaiting the break of day. The darkness of the night totally prevented any communication of one house with another, and it was not until morning that the whole truth could be known. Alas! every bungalow in the station has been destroyed—not one is there that can possibly be inhabited. One solitary puckha-house stood the buffetting of the storm, as it would appear, intended as a refuge for the destitute. It was most providential that some families deserted their own houses during the afternoon and took shelter in any secure place they could find; for had they remained they must have perished. Entire roofs and walls came to the ground, other houses went piecemeal, rafters and thatch coming down, and some have disappeared altogether. Some ladies were obliged to desert their bungalows, and remain in their palkees on the sands the whole night. In fact, no one

has escaped, and many have lost every thing they possess. The drift of the sand was so great, that every thing was buried several feet in it, and a most difficult task it has been to recover property so embedded. The ruins of the houses are almost unfit for repairs, except under a cost equal to the original expense of building, and the whole coast presents one scene of destruction. The city has suffered to a great extent; indeed every house has been blown down, but the immortal remains of Juggurnauth lie undisturbed in his celebrated temple. The surrounding villages have been equal sufferers, and a camp belonging to the revenue surveyor, about 20 miles distant, was totally destroyed. Large trees strew the road, and many lives have been lost in consequence. One family, of eight persons, were crushed under one tree; but the loss of life has been much less than could have been expected. I have not heard of more than forty altogether; but accounts may be brought in hereafter. Altogether the scene has been one I never wish to witness again, for independently of the great pecuniary loss, it has been an awful visitation, which those who have lived and experienced can alone comprehend. Pooree, *3rd May*, 1840."—*Englishman.*

Extracts from the Log Book of the Barque "Elephanta," of Greenock; from Clyde to Calcutta. Reduced to Civil time.

April 28th. Bar. 29·60. From midnight to 8 A.M., wind SE. to EbS. fresh breezes, and cloudy; a heavy swell from the SW. From 8 A.M. till noon, light winds and cloudy. At noon Lat. Obs. 15° 20′ N. Long. Chron. 84° 29′ E. The same till midnight.

29th. NE. fresh breezes and cloudy weather throughout; *a heavy swell from the Eastward;* the current has set the ship EbN. 20 miles these 24 hours. At noon Lat. 16° 24′ N. Long. Chron. 84° 22′ E. P.M. light winds and cloudy weather.

31st. A.M. Fresh breezes from SW. and cloudy, *with a great swell from the* NE.; the ship labouring and pitching very heavy. At Noon, cloudy, the land in sight bearing WbN. to NbW. supposed to be the Dolphin's Nose. At Noon, by very indifferent Obs. Lat. 17° 46′ N., Long. Chron. 84° 28′ E.; to midnight, moderate and fair.

1st May. A.M. SSW. Fresh breezes and cloudy; a swell from the SW. At Noon Lat. 18° 48′ N., Long. Chron. 85° 40′ E. P.M. moderate breezes and hazy weather.

Extract from the Log of the Schooner "Amelia," Captain Ross. Reduced to Civil time.

The "Amelia" was off the Sand Heads when the last gale commenced. Unfortunately during the gale the Barometer was injured, which prevents

any correct information on that head, further than that it fell two-tenths the day previous to the gale.

29*th April*, 1840. At midnight, winds easterly, with light passing squalls. Outer Floating Light bearing EbN. 6 A.M. Wind easterly. Being now to the eastward of the Western Sea Reef, breeze increasing with heavy appearance to windward. Pilot apprehensive of bad weather, recommended standing to sea; stood to the South-eastward. Noon, winds ENE. blowing very hard and sea rising. P.M. winds ENE. increasing to a gale. Midnight, ditto, blowing a hard gale and heavy sea.

30*th April*. 6 A.M. Ditto as before, blowing with violence, and squalls with rain. Noon, ditto weather; shipping much water on deck; soundings in 62 fathoms. 6 P.M. wind east with heavy appearance to the south-eastward, with occasional heavy rain and hard squalls. Midnight, wind SE. with increased violence, now blowing with great fury. Our sails were blown out of the bolt ropes. *A cross turbulent sea rising in pyramids, and breaking over the vessel, while the force of the wind depressed her lee bulwarks under water.** Soundings in 45 fathoms.

1*st May*. 6 A.M. Wind veering southerly, still blowing with fury and a great sea. 8 A.M. Wind SW. rather more moderate. Soundings in 20 fathoms. Wore to the Eastward. Noon, wind SW., gale abating. Found by Obs. that our situation is 15 miles to the southward of False Point in 22 fathoms; bore up for the river.

The two days previous to the gale, we had the wind from the South-eastward, light, with hazy weather, hot and sultry.

The gale commenced from the North-eastward, veering to the Eastward and South-eastward, at which point it blew with the greatest violence, and began to break up soon after it reached the South-west point.

During the gale the heaviest appearance of the sky was to the SE. and Southward. The upper clouds appearing to move N. and NW.† even while the wind was NE.

Extract from the Log of the H. C. F. L. V. "Beacon," C. Hudson, Commander.

April 29*th*, 1840.—A.M. Fresh SE. breeze and cloudy. 4 A.M. Breeze increasing; veering to ESE. cloudy unsettled weather. Daylight, increasing breezes at ESE. and cloudy unsettled weather, heavy sea. 8 A.M. Fresh breezes at Eastward, cloudy unsettled weather. Noon, strong breezes at East, veering to NE. with heavy squalls of wind and rain, threatening appearance. Noon to 4 P.M. blowing in heavy gusts from E. to NE. and ENE. heavy

* This is an instance of the possibility alluded to in p. 46 of my first Memoir, (p 645 Journal As. Soc. for August 1839.) If the shift of wind had been sudden, the vessel would have been laid down against the whole fury of the waves.

† This is somewhat equivocal, for it may mean *to* the N. and NW. or *from* the N. and NW. The observation is nevertheless important.

passing showers, and dark, cloudy, threatening appearance all round. Sunset, blowing hard at ENE. with passing showers, and very threatening appearances to the SE., heavy sea. 8 P.M. Blowing hard at ENE. with passing squalls and light showers, with dark cloudy threatening appearances all round. Midnight, moderating, ENE. breezes and cloudy unsettled appearances to the Eastward.

30th April. A.M. Strong breezes at East, with dark, cloudy, unsettled weather. Daylight, blowing hard at ESE. with very threatening appearances all round, and a heavy cross sea. 8 A.M. Strong breezes at ESE. and dark, cloudy, unsettled appearances to the castward. 8 A.M. to Noon. wind veering from ESE. to East, with continual heavy squalls, and heavy rain, dark dismal clouds, and very threatening appearances all round, with a confused sea. 4 P.M. Strong breezes at East and EbS. with dark cloudy, unsettled weather. Sunset, strong breezes, veering from East to EbS, with dark dismal clouds, and threatening appearance to the SE. with heavy sea. 8 P.M. Strong breezes veering to SE., with dark dismal clouds and unsettled, with threatening appearances all round. Midnight, fresh breezes veering from SE. to SSE. with heavy passing squalls of wind and rain; unsettled appearances and lightning to the Southward, with distant thunder.

1*st May*, 1840.—A.M. Blowing very hard in squalls at SSE. dismal threatening appearances and passing showers, with very heavy sea. 4 A.M. Wind increasing to a gale at SSE. with a very heavy sea. Daylight, blowing a gale at SSE. with dismal threatening appearances. 8 A.M. Gale increasing at SSE. with very threatening appearance, and very heavy sea. Noon, blowing a heavy gale at SSE. very threatening appearance, sea still continuing. 4 P.M. Gale still continuing very heavy, weather clearing up a little; sea still continuing heavy. 8 P.M. Moderate breezes veering to SbW. and SSW. with passing squalls of wind and rain, and unsettled weather, with lightning to the SW. Sunset, moderating a little, and wind veering to Southward and SbW. with passing squalls of wind and rain, sea continuing. Midnight, blowing hard at SSW. and SW. with heavy passing squalls of wind and rain, with dark cloudy weather all round, and lightning to the SW.

Mr. Hudson adds the following remarks. "As the variation of the wind and the appearances of the weather, were correctly stated during the gale, the only remarks I have to make thereon, are, that in every gale I have experienced here, it has invariably began at the Northward, veering to the Eastward, sometimes as far as North-east and back again,* generally breaking up at SW.; the heaviest part of the gale generally being between SE. and South, except the last, the heaviest of which was at WSW., the point at which it broke up."

* So in the MSS.

Extract from the Log of the H. C. L. V. "Hope;" Eastern Channel.
W. Clark, Commander.

Date.	Winds and Weather.	Bar.	Ther.	Remarks.
Wednesday, April 29th, 1840.	A.M. Fresh Easterly breezes, dark, cloudy threatening weather, and lightning,			H. C. L. V. Hope Eastern Channel lying at Anchor 140 fathoms cable.
	3 A.M. Heavy gusts from the Eastward, and passing squalls.			
	Daylight. Strong Easterly breezes and ditto weather.			
	8 A.M. Fresh breezes and cloudy, with passing squalls and rain.	29·67	81·	
	Noon. Strong Easterly breezes and ditto ditto weather; rain at times.	29·65	81·	
	Sunset. Ditto winds and weather.			
	8 P.M. Ditto winds and weather.	29·65	81·	
	Midnight, heavy passing squalls from the Eastward, and ditto weather.			
Thursday, April 30th, 1840.	A.M. Heavy squalls from Eastward, and threatening weather; passing squalls and very heavy sea on.			140 fathoms cable.
	Daylight. Strong East to ESEasterly breezes, cloudy and squally weather.			
	8 A.M. Ditto cloudy, and threatening appearances all round.	29·60	81·	
	Noon. Strong ESEasterly breezes and ditto weather.	29·60	82·	
	Sunset. Blowing hard from East to ES. Easterly, with passing squalls and rain.			
	8 P.M. Blowing hard at SE. Ditto weather.	29·55	81·	
	Midnight. Ditto from SE. to SSE. and ditto weather.			
Friday, May 1st, 1840.	A.M. Blowing a moderate gale at ESE. with heavy gusts at intervals, and rain; weather still threatening; shipping much water.			200 fathoms cable.
	Daylight. Gale increasing at SE. battened down the hatches and made all snug; veered to 200 fathoms cable.			
	8 A.M. gale still continuing at SE. with frequent squalls and rain.	29·50	81·	
	Noon. Moderating a little, veering to the southward, frequent squalls of wind and rain, and heavy sea on.	29·53	83·	
	4 P.M. Decreasing at SSW. very unsettled appearances all round; very heavy sea on.			
	Sunset. Strong SSWesterly breezes, with cloudy and threatening appearances all round.			
	8 P.M. Ditto ditto weather.	29·67	81·	
	10 P.M. Wind shifted suddenly round SSW. to NW. with threatening appearances and much lightning.			
	Midnight. Light variable breezes from NW. to SW. cloudy and threatening appearances to the Westward, and rain.			

Tabular View of the Gale of 29th April, to 2d May, 1840, *at the Pilot Station off the Sand Heads.*

Date, Civil time.	Names of Vessels.	Situation.	Winds, Weather, and Remarks.
April 29th, 1840.	Megna, H. C. P. V.	At anchor 18 fathoms Western Sea Reef.	On the 28th Light breezes from SE. to ESE. First part, wind ENE.; middle and latter East, blowing hard. At daylight squally, and stormy appearance to the Eastward, wind from ENE. Strong Easterly breezes with rain in the evening, and a heavy sea. Bar. fallen to 29·54 at 7-30 P.M. Veered to 90 fs. cable.
	Cauvery, P. V. ..	At anchor 17 fathoms off tail of the Western Sea Reef; South Channel Buoy, NE½E.	On 28th. Fine; wind from SE. to ESE. First part of this day fresh breezes ESE. to ENE. Latter E. to SE. with hard squalls and heavy rain, riding 160 fathoms.
	Seahorse, P. V. ..	At anchor off Northern part of Point Palmiras. 20 fathoms, dark sand.	Strong breezes ENE. to East, and very squally. Vessel labouring much, riding with 120 fs. cable.
	Coleroon, P. V. ..	At anchor Eastern Channel; Floating Light EbS½S. 1½ miles. ..	First part moderate Easterly winds. From 8 A.M. to midnight hard squalls from NE. to ESE. with rain and heavy sea.

N. B. The week preceding moderate, and fine weather. Winds from SW. to SE. On 28th winds variable from ENE. to ESE. and weather fine.

Date, Civil time.	Names of Vessels.	Situation.	Winds, Weather, and Remarks.
30th April 1840.	Megna, P. V. ...	At anchor Western Sea Reef.	Strong gale from the Eastward, heavy squalls. At daylight, heavy squalls and rain from ENE. and very stormy appearance; vessel labouring much. At Noon. Wind rose to a gale from the Eastward. Blowing in heavy gusts with rain. 10 P.M. Increasing, veered to 125 fathoms, then blowing a hard gale and very heavy sea running; vessel shipping much water. Midnight. The wind hauled round to East, still blowing hard.
	Cauvery, P.V.	At anchor as before, 17 fathoms...	First part moderate from ESE., latter fresh gales from SE. to SSE.
	Seahorse, P. V....	At anchor off Northern part of Point Palmiras, as yesterday.	Fresh gales ENE to EbS. with heavy rain; 160 fathoms cable. 4 P.M. gale increasing.
	Coleroon, P. V....	At anchor Eastern Channel Floating Light EbS$\frac{1}{2}$S. 1$\frac{1}{2}$ miles.	First part hard squalls from ESE. Noon; more moderate, latter. 8 P.M. hard squalls SE. to SSW. with lightning and rain. At 10 P.M. blowing a gale at SEbE. and to midnight the same.

Date,. Civil time.	Names of Vessels.	Situation.	Winds, Weather, and Remarks.
1st May, 1840.	Megna, P. V. ..	At anchor Western Sea Reef. ..	Wind, first part, from ESE.; middle, SE.; latter, South. At daylight still blowing a hard gale from ESE. but with a clearer appearance. Noon, began to lull; wind SE. At 4 P.M. wind abating. At Sunset, hauled to South.
	Cauvery, P. V. ..	At anchor as before; drifted into 11½ fathoms on the Western Sea Reef.	A.M. Fresh gales from SSE. to SW. P.M. Moderating from SW. with a squall from WNW. and rain. At 8 A.M. driving on Western Sea Reef with 160 fathoms. Let go a second anchor. Noon, blowing a fresh gale from SWbS. shipped a heavy sea and carried away the tiller. 8-30 P.M. Moderate from SW. Midnight, wind moderate from SW. and cloudy.
	Seahorse, P. V. ..	At anchor off Northern part of Point Palmiras, as before.	Fresh gales ESE. to SSE. with heavy rain at intervals. At 1 A.M. driving. At daylight driving again; 200 fathoms cable. Noon, gale moderating; wind SSE. to SSW. Midnight, moderate.
	Coleroon, P. V. ..	At anchor as before.	Early part a gale from SEbE. Towards morning increasing gale from South, with a very heavy sea. At 10 A.M. gale veered round to SW. shipping heavy seas; riding with 150 fathoms. P.M. gale moderating. Midnight, moderate; SSW. to WSW.

Schooner "Margaret," Capt. Thaddeus; proceeding up the River.

28*th April*, 1840. *Civil time.*—Noon. Lat. 20° 45′ N. Long. 88° 32′ E. 55 fathoms, soft mud. P.M. Fresh breeze ENE. At 9, NE. cloudy, and lightning from SE. and East at midnight.

29*th April.*—Noon. Strong breeze and cloudy; working up. P.M. Small rain. P.M. ENE. and at 5, NE. Midnight; strong breeze NE. and threatening gloomy weather, with drizzling rain.

30*th April.* Wind ENE. At daylight threatening. Noon, passed Diamond Harbour, midnight hard squalls. At anchor off Wollooburrya.

1*st May.* A.M. ENE. Wind fresh breeze and rainy, cloudy and threatening at daylight. At 8-30, wind SSE. strong breeze. Noon, heavy gales. 4-30. P.M. Wind South. Midnight, heavy gale with small rain. At anchor half way between Wollooburrya and Calcutta.

2*nd May.* A. M. Wind South. Strong gale with small rain; arrived at Calcutta. P. M. SSW. Wind, with rain.

At Calcutta,

the following are my own observations. The Barometer is corrected to the standard at the Surveyor-General's Office.

29*th April*, 1840. *Civil time.*—At 8 A. M. Bar. 29·74. Squalls from the NE. During the day close sultry weather, calms and light squalls at times from NE. with drizzling rain. At 7 P. M. Close and sultry, drizzling rain and light airs from the NE. with cloudy, gloomy, weather all round. Bar. 29·67. During the night, gloomy weather, with light breezes, from the E. and NE.

30*th April.*—The same weather continuing. At noon squalls and drizzling rain from East and ENE. Bar. 29·64. Calms and heavy rain to 4½ P. M. Bar. 29·57. Evening and to midnight, light airs from the East, dark gloomy weather, and drizzling rain at times.

1*st May.*—From midnight to 6 A. M. dark gloomy weather, with light breezes and squalls at times from East and ESE. At 6 A. M. Bar. 29·52. A squall from the SE. with heavy rain: scud flying fast from the SE. 10½ A. M. Bar. 29·52. Strong breeze SE. with squalls. Noon. Bar. 29·47. A gale with heavy squalls SE. to ESE. with heavy rain, 3 P.M. Bar. 29·39. Gale in heavy squalls, from SSE. 4¼ P.M. Wind S. (gale) with frequent squalls, Bar. 29·39.

5½ P. M. The same. Bar. 29·40. 6½ P. M. SbW. Heavy dark scud and squalls. Bar. 29·42. 7½ Sudden squalls and lulls between them, from SSW. and SW. Bar. 29·45. 9 P. M. The same; squalls hauling to SW. Bar. 29·52.

2*nd May.*—5 A. M. Bar. 29·58. Fine weather.

I have inserted the following report on the principle, that no knowledge should be, in the present state of the inquiry, set aside; but I do not think it has much relation to our present subject.

Report from the Collector of Coringa to the Government of India.

"As it may enable the gentleman who has undertaken to investigate the course of storms, to fix with some accuracy the extent to which the late gale of the 30th April and 1st May reached, I have the honor to forward an extract from the Log just received from the Coringa Lighthouse from 6 P.M. of the 1st ultimo, till midnight; when the wind died away. This squall appears to have been the tail of the storm, and did not, I should think, extend much farther along this coast. The weather for two or three days before had been very threatening, and I understand the Barometer fell to a considerable extent, but as the instrument for the Lighthouse has not yet been received from Madras, I regret that I am unable to furnish you with a more accurate report."

"G. SMITH."

Extract from the Log kept at the Lighthouse at Coringa.

Hours.	Winds.	Remarks on Friday, 1st May, 1840.
6 P.M.	SW.	Wind moderating, and a squall brewing in the NW.
7.	,,	The squall, with thunder and lightning, com-
8.	Westerly,	menced blowing from this quarter with a smart shower of rain.
9.	SW.	
10.	,,	Blowing very fresh.
11.	,,	
12.	,,	Wind moderating, weather clearing up.

The Brig "Union," from Coringa to Pondicherry. Forwarded by Capt. Biden, Master Attendant, Madras.

On the 30*th April*, when she was at Noon in Lat. 14° 19′ N. Long. 82° 15′ E. had smart breezes from SW. amounting to strong gale, and high sea. At midnight, wind South, strong gales with dark gloomy weather, and a turbulent sea, laid to under bare poles.

1*st May.* At 3 A.M. wind SSW. Daylight, moderating; made sail, wind SWbS. and SSW. till noon, when fresh breeze and hazy weather. Lat. 14° 49′ N. Long. 81° 18′ E. P.M. moderating, but towards, and at, midnight increasing again to fresh gales SbW. to SSW. and high confused sea.

2*nd May.* Wind SW. to SE. at noon, when it moderated to light airs from that quarter. Lat. 14° 26′ N. Long. 80° 15′ E.

Extract from the Log of the Barque "Sarah," from Vizagapatam towards Madras. Reduced to Civil time. Forwarded by Captain Biden, Master Attendant, Madras.

30th April, 1840.—P.M. Fresh breezes SW. to 7 P.M., veering to SbE. at 7 and South at 8, with cloudy weather till midnight.

1st May.—At 2 A.M. hard gales SW. veering to NW. at 4, and again to SSW. At 7 heavy lightning, split several sails. At noon moderating, Lat. 13° 25′ N. Long. 82° 47′ E. Bar. 29.56. P.M. Wind SbE. fresh breezes and cloudy, till midnight.

Extracts from the Meteorological Journal kept at the Madras Observatory.

Date,	Barometer.			Thermometer.		
	8 A.M.	4 P.M.	10 P.M.	8 A.M.	4 P.M.	10 P.M.
1840. April 26th.	29.776	....	29.766	86·0	....	87.3
27th.	29.720	29.614	29.706	86.3	91.0	89.7
28th.	29.700	29.628	29.720	86.4	90.0	88.4
29th.	29.680	29.605	29.684	87.2	91.3	89.2
30th.	29.680	29.568	29.680	87.9	99.0	89.8
May 1st.	29.720	29.643	29.798	88.3	93.0	86.5
2nd	29.820	29.750	29.858	86.0	89.0	87.8

The following table is extracted from a Meteorological Register kept at Chuprah, by Mr. Ravenshaw of the Civil Service.

April	24	29·64	87½	29·57	88½	East variable 4 P.M. NbW.
	25	29·54	88	29·36	88¾	Variable. Do. Do, Gale from E. at 6½ P.M.
	26	29·48	86	29·46	87½	Strong Gale from E. all night, to present hour 10 A.M. accompanied with clouds, but no rain. At 4½ still blowing from E., but more moderate. At 10½ P.M. still blowing; fresh Gale all night.
	27	29·52	86	29·48	87½	Ditto. 4½ P.M. E. fresh more moderate.
	28	29·56	87½			Gale continues.
	29	29·62	87½	29·56	88	Strong wind but variable ENE. cloudy, at 4½ E. moderate.
	30	29·56	88	29·52	88¾	East moderate Do. fresh.
May	1	29·53	86	29·53	86	N. B. (SE. Gale at Calcutta,) N.E. blowing fresh cloudy. 4½ P.M. squall at NbE. rain
	2	29·53	83	29·50	84	Variable, rain all night. Do. Cloudy, sky overcast.

Memoranda from Dadoopoor, Kurnaul, and Hansie, of a storm which occurred at those places on the evening of the 4th May, 1840; *forwarded by Lieut. Baker. Dadoopoor. Report of Mr. W. Dawe, Delhi Canal Department.*

On the 4th (the day of the storm), the wind had been blowing strong from the Eastward all day, but about 7 P.M. heavy clouds appeared in the SW. to West quarters, with thunder and lightning. The storm came on at 7 hours, 45 minutes, from the southward of West. But by 8 P.M. it had settled at North-west, and continued to blow steadily till about 9 P.M. with a few drops of rain. From this period till 10 P.M. the thunder was heavy and continued, and the lightning vivid. But the wind came in sudden and heavy gusts, which has done much damage to the trees, &c. As the crops had been cut, by the appearances after the storm had subsided it might have been concluded that it was only one of usual occurrence; but as good sized trees have been broken short off, this proves that it was otherwise.

By reports from the Deyrah Dhoon, and Saharunpoor district, it appears the storm has been as severe at those places also.

DADOOPOOR, 14*th May*, 1840. WILLIAM DAWE, *Conductor.*

Copy of the Meteorological Register kept at Dadoopoor, for the first week of the month of May, 1840.

Dates.	Observations day-break.					Ditto at 10 A.M.					Ditto at 4 P.M.				Ditto at 10 P.M.				Remarks.
	Barometer.	Thermometer. Attached.	Detached.	Wet bulb.	Rain Gauge.	Barometer.	Thermometer. Attached.	Detached.	Wet bulb.		Barometer.	Thermometer. Attached.	Detached.	Wet bulb.	Rain Gauge.	Barometer.	Thermometer. Attached.	Detached	Wet bulb.	
May, 1840. 1	28·526	68 ,,	67 ,,	65 ,,	,, ,,	28·725	95 ,,	94 ,,	81 ,,		28·620	103 ,,	102 ,,	86 50	,, ,,	28·602	79 ,,	78 ,,	74 ,,	Clear, light, variable wind.
2	28·540	70 ,,	69 ,,	66 50	,, ,,	28·636	96 ,,	95 ,,	80 ,,		28·590	103 ,,	100 50	83 50	,, ,,	28·622	80 ,,	78 ,,	72 ,,	Clear, light, variable wind.
3	28·660	80 ,,	79 ,,	73 ,,	,, ,,	28·766	92 ,,	91 ,,	80 ,,		28·766	100 ,,	99 ,,	80 ,,	,, ,,	28·652	83 ,,	82 ,,	79 ,,	Clear strong easterly wind.
4	28·540	77 ,,	76 ,,	74 ,,	,, ,,	28·702	92 ,,	91 ,,	83 ,,		28·544	100 50	100 ,,	87 ,,	,, ,,	28·624	74 ,,	72 ,,	70 ,,	A.M. Clear strong easterly wind. P.M. a storm from W. to N.W. with rain.
5	28·576	73 ,,	72 ,,	67 ,,	,, 50	28·694	88 ,,	87 ,,	78 ,,		28·614	91 ,,	90 ,,	80 ,,	0 03	28·662	75 ,,	74 ,,	69 ,,	A.M. Clear, light, easterly wind. P.M. Squall, easterly shower.
6	28·712	69 ,,	68 ,,	66 ,,	,, ,,	28·828	83 ,,	83 ,,	74 ,,		28·786	92 50	92 ,,	78 ,,	,, ,,	28·790	78 ,,	77 ,,	70 ,,	Clear, light, easterly wind.
7	28·742	68 ,,	67 ,,	66 ,,	,, ,,	28·828	86 ,,	85 ,,	75 ,,		28·736	95 ,,	94 ,,	75 ,,	,, ,,	28·742	79 ,,	78 ,,	73 ,,	Clear, strong, easterly wind.

Kurnaul. Lieut. Baker's Report.

We had westerly winds at Kurnaul on the 1st and 2nd instant; and on 3rd and 4th, a strong breeze from the Eastward, and 3 or 4 P.M. on the 4th, a heavy bank of clouds appeared to the westward. About sunset we had frightful gusts of wind from the West, North and North-east, the air during the intervals being sultry and oppressive.

About 8¾ P.M. the sky became entirely overcast, and a violent squall of wind began to blow from the Westward, accompanied by clouds of dust, and latterly a few drops of rain. The wind continued to blow from the West with more or less violence for about two hours, when it gradually went round to the East, from which quarter it continued to blow till 2 P.M. on the 5th, when it was interrupted by a second (less violent) squall, from the Westward, accompanied by a slight shower of rain.

The strength of the wind during the first squall must have been considerable, as it unroofed many out-offices at the station, and blew down many hundred trees on the Canal banks.

Hansie. Report of Mr. T. Johnson, Delhi Canal Department.

I have the honor to report, agreeable to the Government Notification dated 11th September, 1839, that this station was visited by a storm of wind and dust on the evening of the 4th May, 1840.

The storm commenced at ¼ past 8 o'clock P.M. from the NW. the wind blowing in strong gusts, bringing with it dense masses of dust; its duration was for ¾ of an hour, when the wind veered round to the NE. and continued to blow a stiff breeze from that point nearly all night, unaccompanied by dust. There were masses of clouds with much lightning passing along the northern horizon, but none of the clouds came over this neighbourhood, nor did I hear any thunder. I am inclined to think that the storm did not extend much further than this to the South or South-east, for what came here was lateral, and apparently from some heavy storm at a great distance from this.

The thermometer during the day had been up to 106° and at the commencement 90°, At the subsiding of the storm it was down to 76°.

The following logs have also reached me; and that no knowledge of the weather prevailing about the Bay at the time of the storm, should be lost, I have printed them. I shall remark upon them after summing up the evidence we have for the track of the storm.

Extract from the log of the Packet Columbia; from Calcutta towards Singapore. Civil time.

On the 24th April.—At noon in Lat. 5° 10′ N. Long. 99° 53′ East; light breezes and fine weather. At 10 P.M. very threatening to the Southward. At midnight a tremendous heavy squall, with much rain, thunder and lightning, and the wind veered suddenly to the SWestward.

25th April.—At 5 A.M. hard squalls, winds variable from SW. to SE. Daylight, strong breezes with a heavy head sea. Noon, strong breezes with a very heavy sea. Lat. 4° 49′ N. Long. 99° 42′ E. P.M. Moderating about midnight; wind SE. throughout.

26th April.—At 10 A.M. increasing again from SSE. to SE. Noon, Lat. 4° 53′ N. Long. 100° 1′ E. off Pulo Penang. Wind SSE., breeze increasing from SE. till midnight.

27th April.—A.M. A gale at SE. with a tremendous sea, frequently heaving the vessel on her beam ends. At Noon. Lat. 4°46′ N. Long. 99°50′ E. Towards midnight moderating from SSE. but increasing so much the next day, as to oblige the vessel to go into Penang harbour.

Extract from the Log of the Brig Pyeen Boun, from Moulmein to Madras; from Capt. Biden, Master Attendant, Madras; supposed by Nautical time.

April 29th, 1840.—Lat. 15° 52′ N. Long. 97° 5′ E. Hard squalls with occasional showers of rain, and a high sea running this day; wind at SSW.

April 30th.—Increasing heavy squalls from SSW. with lulls at intervals; a heavy sea running throughout the 24 hours; sent down topgallant masts and yards.

May 1st.—Hard gales from SW. with thunder, lightning, and rain, and a heavy confused sea running, breaking occasionally over the vessel. Under closed-reefed topsails.

May 2nd.—Increasing gales from SW., with heavy dark appearance, thunder and lightning, and a very high sea running. Split both topsails, unbent them; bent, and close-reefed two others.

May 3d.—Lat. 14° 32′ N. Long. 96° 30′ E.

H. C. S. Amherst. Gale of 27th April to 1st May, 1840.

The H. C. S. " Amherst" was lying at Kyook Phoo, and experienced, as by her log, nothing but squally and rainy weather at times from the 28*th April* to 1*st May*. The winds were moderate, and variable from ESE. to SE. South and SSW.

From the " Colombo Observer."

On Saturday night, 25*th April* 1840, a strong breeze of wind commenced, amounting almost to a gale—apparently the beginning of the Monsoon—accompanied, as usual, with a heavy sea and a high surf over the Bar, which has since continued. In this state of the weather a wharf jolly-boat, returning from the Persia, when crossing the Bar, was swamped, and, melancholy to relate, three persons were drowned.

The ship Recovery, Captain Johnstone, was at noon of the 28*th April* in Lat. 5° 43′ N., steering to the NNE. to round Ceylon. At noon of the 29*th*, she was in 7° 20′ N. with Westminster Abbey bearing SWbW. At noon on the 30*th* having stood north 126, miles she was in Lat. 9° 40′ N. and at noon on the 1*st May* in 11° 57′ N. having stood north 149 miles, and had fine weather throughout these days.

Barque " Cornwallis," from Bombay towards Calcutta. Civil time.

At noon on 28*th April* in Lat. 11° 50′ N., Long. Chron. 74° 48′ E. Fine weather till midnight.

29*th April.*—Midnight, strong 6 knot breeze NW. Hazy strong SSE. Daylight and to Noon heavy westerly swell. Noon Lat. 9° 14′ N. Long 75° 50′ E. increasing to sunset and midnight. Wind NW. throughout. A.M. 30*th April,* strong breezes SW. to Noon, heavy westerly swell. Noon Lat. 7° 3′ N. 78° 15′ E.; P.M. and to midnight, very heavy swell from West; wind westerly; thick hazy weather.

1*st May,*—Light 5 knot breezes at daylight, and fine weather; vessel labouring so much with the heavy westerly swell, that it is feared she may roll away her masts. Hove to to set up the rigging at Noon. Wind westerly throughout Lat. 5° 47′ N. Long. 80° 20′ E. High swell continuing till midnight, when it abated and is not mentioned on the 2*nd.*

I have next, as in the former Memoir, arranged the winds and weather experienced at Noon, Civil time, by each of the different vessels, and at the stations within the Bay of Bengal, in a tabular form; so as to afford a ready reference from the chart and diagrams, and to shew more strikingly than by detailed accounts, the remarkable contrasts which different points of the space comprised in the charts, exhibit.

Tabular View of the Hurricane in the Bay of Bengal, and at Cuttack, of 27th April to 2nd May, 1840.

Date, Civil time.	Names of Vessels and Places.	Winds and Weather.	Lat. N.	Lon. E.	Bar.	Simp.	Ther.	Remarks.
			° ′	° ′				
Noon. 27th April, 1840.	Nusserath Shaw,	ENE. strong breezes; dark cloudy, ...	16 2	91 21	...	...	...	Increasing sea.
	Tenasserim, ...	Easterly fresh breeze, ...	17 40	90 50	...	...	...	
	Freak, ...	Wind light; hauling to the East, ...	18 56	88 30	...	...	...	
	Flowers of Ugie,	SE. fine clear weather, ...	19 52	89 24	...	...	...	Steering to the S. Westward.
	Christopher Rawson.	SSE. light and sultry, ...	17 15	...	29.80	...	...	Heavy swell from the SW.
	Elephanta, ...	SW. to SSW. moderate and fair, ...	13 52	83 50	29.60			
	At Madras, ...	... ...	...	...	29.67	...	88	A.M. Blowing in hard gales from Westward with rain.
	Amelia Thompson,	West, moderate and fine, ...	4 14	88 18	...	...	...	
	Ganges, ...	SSW. to SW. hard gale, ...	7 10	95 18	29.60	...	...	On 26th, in Lat 6° 37′ N. Long. 95°56′ E. fresh gale at SSW. veering to the SW. On 27th, hove to under storm stay-sails. Bar. 29·50

Date, Civil time.	Names of Vessels and Places	Winds and Weather.	Lat. N.	Lon. E.	Bar.	Simp.	Ther.	Remarks.
			° ′	° ′				
Noon. 28th April, 1840.	Nusserath Shaw,	ENE. a hurricane.	14 26	91 34	...	...	...	At 10 A.M. Lost mizen mast, blowing a hurricane. 3 P.M. wind shifted to South-westward.
	Veetis, ...	East fresh breezes and cloudy, ...	18 37	87 55				
	George and Mary,	Vecring from SW. to East fine breeze, ...	...	...	...	...	...	At 6 P.M. Heavy bank to the SW.
	Tenasserim, ...	South-eastward, heavy gale,	...	...	...	...	...	Sea making a continued breach over the vessel, gale increasing.
	Freak, ...	Hauling to NNE. strong breeze and threatening,	17 40	88 32	...	...	...	At 6 P.M. Gale increasing rapidly from NNE.
	Flowers of Ugie,	ESE. smart breeze and clear,	19 19	88 22	29·17	...	...	Increasing breeze veering to East at 7 P.M. with very bad appearance to the SE.; standing to the SW.
	Christopher Rawson, ...	East to ESE. heavy appearance, ...	17 29	...	29·40	...	...	Running in for a pilot.
	Elephanta, ...	EbS. light winds and cloudy, ...	15 20	84 20	...	...	...	Heavy swell from SW.
	At Madras,... ...		...	...	29·66	...	89	
	Cornwallis,... ...	Fine weather, westerly breeze, ...	11 50	74 48	...			
	Amelia Thompson,	WSW. moderate, ...	4 25	87 48	...			
	Clarissa, ...	West to WSW. squalls and rain,...	7 11	87 56	...	...	...	Blowing hard and high sea, but not a gale.
	Ganges, ...	Clearing up, ...	8 7	94 33	29·80	...	...	Wind not specified.

Date, Civil time.	Names of Vessels and Places.	Winds and Weather.	Lat. N.	Lon. E.	Bar.	Simp.	Ther.	Remarks.
			° ′	° ′				
Noon. 29th April, 1840.	Nusserath Shaw.	SbW. squally and rain, ...	15 23	90 31	...	...	...	Fresh gales and heavy weather, with dreadful gusts of wind and squalls, sea breaking over the ship, 3 ft. water in the hold.
	Vectis, ...	*Variable!* full hurrieane,	16 58	88 4	...	...	...	Full hurrieane with a heavy sea, vessel on her beam ends with deeks cleared, loss of top masts &e.
	George and Mary,	NNW. a mere hurricane,...	16 0	84 30	...	...	...	Hurricane, lasting for about six hours from NNW. then veering East and ESE.
	Tenasserim, ...	SE. gale, blowing hard, ...	16 32	91 2	...	...	...	Rather elear, but still blowing hard.
	Pyeen Boun, ...	SSW. hard squalls, ...	15 52	97 5	...	...	...	Showers of rain. High sea running.
	Freak,...	SW. blowing furiously, ...	16 2	88.36	...	...	...	Hurricane since midnight.
	Flowers of Ugie,...	NE. at 10, and north at 11, and NW. at 1 P.M. heavy gales, ...	17 15	86 43	28·36*	...	...	Hove to under bare poles; heavy sea and very bad weather.
	La Belle Allianee,	NE? inereasing gale and hard squalls, ...	...	...	...	...	...	Thick hazy weather, P.M. gale increasing fast, off Point Palmiras.
	Chirstopher Rawson, ...	East to ESE. in squalls, heavy gale, ...	...	...	...	...	...	SSW. 30 from floating light. Gale increasing fast, confused sea.
	Hope, L. Vessel,	Easterly strong breezes and cloudy, ...	21 26	88 07	29 65	...	81	At the inner station; 140 fathoms of cable out.
	Beacon, L. Vessel,	East, veering to NE. heavy squalls, ...	21 04	88 27	...	...	...	Threatening appearanee; moderating at midnight.

* Probably by mistake see remarks—H. P.

Date, Civil Time.	Names of Vessels and Places.	Winds and Weather.	Lat. N.	Lon. E.	Bar.	Simp.	Ther.	Remarks.
			° ′	° ′				
Noon. 29th April, 1840. *Continued.*	Megna, P. V. ...	East and ENE. blowing hard, ...	...	...	...	...	...	At anchor Western Sea Reef; 18 fathoms, 90 fathoms cable out.
	Cauvery, P. V. ...	East to ENE. and ESE. hard squalls, ...	...	...	...	...	...	At anchor, tail of Western Sea Reef; 160 fathoms cable out.
	Coleroon, P. V. ...	NE. to ESE. hard squalls,	...	...	...	...	...	At anchor near Floating Light.
	Amelia, ...	ENE. blowing very hard,	...	...	...	...	...	Sea rising, increasing to a gale. Standing to sea with a pilot on board.
	Elephanta, ...	NE. fresh breeze and cloudy weather, ...	16 20	84 22	...	...	...	Heavy swell from the Eastward, and current to the Westward of 20 24.
	At Calcutta, ...	NE. calms and light airs,...	22 34	88 22	...	...	...	Close sultry weather and drizzling rain.
	Margaret, ...	ENE. strong breeze and rain,...	...	...	...	...	...	Between Kedgeree and Diamond Harbour.
	At Balasore, ...	NE. rain and squally, ...	21 28	87 10	29.66	...	85	
	At Pooree or Juggurnath, ...	NbE. strong wind, ...	19 48	85 45	...	...	...	Increasing breeze to midnight.
	At Madras,... ...		...	...	29.64	...	89	
	Cornwallis,... ...	NW. increasing breeze, ...	9 14	75 50				
	Clarissa, ...	Moderate on this day, ...						

Date, Civil time.	Names of Vessels and Places.	Winds and weather.	Lat. N.	Lon. E.	Bar.	Simp.	Ther.	Remarks.
			° ′	° ′				
Noon. 30th April, 1840.	Nusserath Shaw,	SE. fresh gales, ...	...	...	...	...	...	Bore up for Calcutta; heavy cross sea.
	Veetis, ...	SbW. gale continuing, ...	17 40	88 10	...	...	...	Very high sea.
	Tenasserim, ...	SSE? moderate,...	16 21	91 50	...	...	...	Becoming fine.
	Union,...	SW. strong gales and high sea, ...	14 19	82 15	...	...	...	Veering to South by midnight, and SSW. by 3 AM. 1st May. Laid to under bare poles.
	Pyeen Boun, ...	SSW. Increasing, heavy squalls, ...	...	...	...	...	...	Heavy squalls with lulls at intervals, and heavy sea; preparing for bad weather.
	Freak,...	SW. a little moderating, ...	16 41	88 0	...	...	...	
	Flowers of Ugie.	South; very heavy gales and bad weather, ...	17 48	86 53	29.11*	...	...	
	La Belle Allianee.	SSW. a violent gale with awful gusts, ...	...	...	28.60	...	...	At 11 AM. shift of wind from NEastward to SSW. Heavy sea.
	Christopher Rawson.	SSE. heavy gale, ...	20 28	...	28.90	...	...	Under bare poles in the trough of the sea.
	Hope, L. Vessel.	Strong ESE. breezes and threatening, ...	21 26	88 07	29.60	...	82	140 fathoms of cable out.
	Beaeon, L. Vessel.	ESE. to East, heavy squalls and threatening weather,	21 14	88 27	...	...	...	
	Megna, P. V. ...	N. to ENE. blowing a gale,	...	...	...	...	...	At anchor Western Sea Reef 125 fathoms eable. Heavy sea.
	Cauvery, P. V. ...	Fresh gales ESE.	...	...	...	...	...	Ditto Ditto.

* Corrected.

Date, Civil time.	Names of Vessels and Places.	Winds and Weather.	Lat. N.	Lon. E.	Bar.	Simp.	Ther.	Remarks.
			° ′	° ′				
Noon. 30th April, 1840. *Continued.*	Coleroon, P. V. ...	ESEasterly, veering to SEbE. moderating,... ...	...	...	...	...	...	At anchor near Floating Light P.M. Gale at SEbE.
	Amelia, ...	At EbN. blowing a hard gale, ...	...	...	...	...	...	Heavy sea, wind veering to East at 6 P.M. and SE. at midnight.
	Elephanta, ...	SW. fresh breeze and cloudy,	17 46	84 28	...	...	...	A great swell from the NE. Ship labouring much.
	At Calcutta, ...	Light East to ESE. squalls and drizzling rain. ...	22 34	88 22	29·64	...	...	To midnight, light airs and gloomy, drizzling weather.
	Margaret, ...	ENE. threatening, ...	...	...	...	...	...	Passing Diamond Harbour.
	At Balasore, ...	NE. rain and puffy, ...	21 28	87 10	29·57	...	82	
	At Pooree or Juggurnath, ...	NE. heavy gale, ...	19 48	85 45	...	...	...	Incessant rain. Shift of wind at 8 P.M.
	At Madras, ...		...	...	29·66	...	89	
	Cornwallis, ...	NW. Strong breeze; thick hazy weather, ...	7 3	78 15	...	...	...	P.M. Very heavy swell from the Westward.
	Moira, ...	SW. smart breeze increasing	14 19	82 15	...	...	...	P.M. Increasing to strong gales at South, by midnight.
	Sarah, ...	SW. fresh breezes, ...						

Date, Civil time.	Names of Vessels and Places.	Winds and Weather.	Lat.N.	Lon.E.	Bar.	Simp.	Ther.	Remarks.
			° ′	° ′				
Noon. 1st May, 1840.	Veetis, ...	SSW. fresh gales and squally...	18 43	88 18	...	...	...	Bore up for Caleutta.
	Union, ...	SSW. and SWbS. fresh breezes hazy, ...	14 19	81 18	...	...	...	Increasing again to fresh gales SbW. and SSW. at midnight.
	Pyeen Boun, ...	SW. hard gales, thunder, lightning, and rain, ...	...	...	...	...	...	Confused sea; under elose-reefed topsails.
	Freak, ...	Moderate breeze,...	17 26	87 47	...	...	...	
	Flowers of Ugie,	South, moderate and fine,...	18 23	86 58	...	...	...	
	La Belle Allianee,	Moderating from the Southward,...	...	...	29·30	...	...	Moderating from 5 A.M.
	Christopher Rawson, ...	SSW. elearing a little, ...	...	...	...	...	...	In 16 fathoms; off Point Palmiras; ship lying helpless. P.M. Moderating.
	Hope, L. Vessel,	Moderating and veering to the Southward, ...	21 26	88 07	29·53	...	83	200 fathoms eable out. Heavy sea on.
	Beaeon, L. Vessel,	SSE. heavy gale and sea,...	21 04	88 27	...	...	...	P.M. Clearing up a little, veering to SSW. at midnight.
	Megna, P.V. ...	SE. beginning to lull, ...	...	...	...	...	...	At anehor; Western Sea Reef. Sunset; wind south.
	Cauvery, ...	SWbS. fresh gale, ...	...	...	...	...	...	Driving on the Western Sea Reef with 160 fs. of eable out; at 8-30, moderate.
	Coleroon, ...	SW. gale, ...	...	...	...	...	...	At anehor as before. At 10 A.M. gale veered to SW.

Date, Civil time.	Names of Vessels and Places.	Winds and Weather.	Lat. N.	Lon. E.	Bar.	Simp.	Ther.	Remarks.
			° ′	° ′				
Noon. 1st May, 1840. *Continued.*	Amelia, ...	SW. gale abating, ...	...	...	...	...	...	15 miles to the south of Point Palmiras in 22 fs. Bore up.
	Elephanta, ...	SSW. moderate and hazy,	18 48	85 40	...	...	...	
	At Calcutta, ...	SE. to ESE. Gale with squalls.	22 34	88 22	29.47	...	...	Gale began at 6 A.M. and ended at about 9 P.M. to midnight.
	Margaret, ...	SSE. heavy gale, ...	...	...	...	...	...	At anchor Wollooburrya 12 miles below Calcutta.
	At Balasore, ...	South strong gusts, ...	21 28	87 10	29.43	...	81	Wind veering from NE. to South at 8 A. M.
	At Pooree or Juggurnath, ...	SW. gusts at times, ...	19 48	85 45	...	...	...	Gale abating from 4 A. M.
	At Coringa, L. H.							
	At Madras, ...		...	...	29.70	...	90	A heavy squall from SW. for three or four hours at 7 P. M.
	Cornwallis, ...	Westerly breeze and fine, ...	5 47	80 20	...	...	...	Fine weather, but tremendous swell, continuing till midnight.
	Union, ...	SSW. fresh breeze and hazy,	14 49	81 18	...	...	...	
	Sarah, ...	SbE. moderating, ...	13 25	82 47	29.56	...	...	A Gale veering from SW. to NW. and SSW. the preceding 12 hours.

We have now to show what is the evidence we possess for—

I. The formation of the vortex, and evidence for its form.

II. Its size

III. Its rate of progression.

I. *The formation of the vortex and evidence for its form.* Our evidence for the actual circle laid down on the 27*th* is, as will be subsequently seen in speaking of the centres, very imperfect; as is also that of the 28*th*, where all we know is, that it *was* a veering hurricane with the *Nusserath Shaw*, and could not be said to reach the *Freak* till the evening. Hence I have taken it to be a vortex of about 300 miles in diameter, and that the *Tenasserim's* SE. gale was a little without the circle, though really arising from the same disturbance. The diagrams, and the subsequent remarks upon the evidence by which I have placed the different centres, will render unnecessary any further detail upon this head.

In estimating the centres for the different days, I have been guided as follows,—

On the 27*th*, we have the logs of the *Nusserath Shaw* and *Tenasserim* available, and of these, the *Nusserath Shaw*—near to which vessel the centre passed on the following day at 3 P.M. when she had the shift of wind,—must of course have been the nearest to it. She had the wind steady from ENE. during the whole of the 24 hours (from noon 27*th* to noon 28*th*) an evidence that she was on the direct line of the track of the storm. She also made good, from noon to noon, a course of 100 miles S. 7° E.; while the track of the storm (by projection from the shift which she experienced, from ENE. to SW.) must have been about N. 34° W. and S. 34° E. so that we may say, without much exaggeration, that the ship travelled 100 miles, and the hurricane 180 miles almost directly towards each other! A very remarkable instance of the truth and value of the Theory of Storms, if rightly understood; for it is clear that this, which happened to a single ship, might have happened to a whole fleet! Heaving to for six hours, would have saved the owners and underwriters the heavy loss which the dismasting and return of this vessel to Calcutta entailed; and a good Barometer and Simpiesometer on board, would infallibly have indicated the coming danger in time.

The *Tenasserim* seems but just to have felt the first puffs of the storm on this day.

It will be remarked in the table for this day, that the *Ganges* in Lat. 7° 10′ N. Long. 95° 18′ E. was hove to from the day preceding, in a heavy gale blowing "from SSW. to SW." The chart does not admit my including her position, but if projected, it will be found that if the circle of the storm was completed, she was about on the opposite side of it from the *Nusserath Shaw;* and I have thus, with reference to the rate of travelling of the centre of the storm, between the 28*th* and 29*th*, assumed that it may have been about half way between them, or 290 miles from each. This would give it a circle of 580 miles on the first day, and we have no better authorities. The brief extract from the log of the *Clarissa* which vessel it will be seen, could not be far from the same latitude* on the 27*th;* being on the 28*th* in 7° 1′ N. but seven degrees further west; (her Long. being 87° 56′ E.) gives us "blowing hard from West to WSW.," so that there was probably, as in the gale of June, 1839, a Westerly and South-westerly gale blowing across the mouth of the Bay, while the vortex was forming and travelling over from the Andamans to Cuttack. "The fine weather and SE. breezes" of the *Flowers of Ugie* and *Christopher Rawson* are exactly what should occur on the northern arm of a parabola formed by the deflection of a heavy SWesterly monsoon, setting in from the Bay against the high land of the Malay Peninsula.

For the 28*th April.* If we take the storm to have now travelled at the rate of 7 miles an hour, its centre at noon may have been about 15 to 25 miles SSE. from the *Nusserath Shaw;* since this ship had, at 3 P.M. the shift of wind from ENE. to SW. as shown by her log; so that the centre must have passed near her, to the Southward, or even over her. The *Tenasserim* at 180 miles distance, had the wind at SE. "a heavy gale" though if this was the hurricane, she should by her position, which is nearly due north of the *Nusserath Shaw's*, have had the wind at East. As there can be no doubt about the *Nusserath Shaw* having had the centre close to her at noon, and that her position was not far wrong, I have taken the

* Being bound from Penang to Madras, she had to make a westerly course across the Bay.

point marked, 20 miles to the SE. of her, for its place at noon. The *Tenasserim* had probably her part of the storm somewhat deflected by the opening between the Andamans and Cape Negrais? or was not properly within the vortex, but in the northern arm of the parabola of the monsoon. The *Freak* and *Vectis* can scarcely be said to have felt the storm at noon on this day; the *Freak* at least not till 6 P.M., when it was a rapidly increasing gale at NNE., so that its circle may have been about 300 miles in diameter at this time.

On the 29*th April*, we find that the *Freak*—which vessel had had the gale rapidly increasing from NNE. at 6 P.M. on the 28th,—had it veering to NW. at midnight between the 28*th* and 29*th*, and to SW. by 6 A.M. or daylight; making on the whole 14 points of veering in 12 hours. At noon she had it also SW. Projecting this, it shows that the centre may have passed some 30 or 40 miles to the North-eastward of her position at midnight, which is very carefully laid down by Capt. Smoult; and that it was travelling in a N. Westerly direction. The *Flowers of Ugie* also, with a very careful log and corrected Barometer, had, we find, the storm increasing, from "squally with rain" at 4 A.M. to heaving to under bare poles at 11; the wind from East at midnight, to NE. at 10; North at 11; NW. at 1 P.M.; West at 3; SW. at 5; and South at 8 P.M. With her Barometer at 28·36, and the wind veering 16 points in the seven hours! between 10 A.M., and 5 P.M. or $2\frac{1}{4}$ points per hour; she cannot have been more than 15, or 20 miles at the utmost, from the centre. I should estimate it to have passed also to the NE. of her position. By projection I find 12 miles may have been her distance from the centre.

The log of the *Vectis*, though the centre cannot have passed far from her, is by no means so carefully kept as those of the *Freak* and *Flowers of Ugie*; so that, though I have placed her as I found it written, I am inclined to think that she may have been nearer to the *Flowers of Ugie* than she is placed on the chart.

That of the *George and Mary* presents also some anomalies, and the very remarkable one, that the wind seems to have veered as if the storm had passed close to the Southward of her. This could not have been, at all events, the same vortex. Did any division take place of the main vortex into two? which might account for this? and for the anomalies in the log of the *Vectis*? I should be unwilling, however, to suppose this,

upon the very imperfect statement which has reached me, and this written by the clerk of a commercial house, who was probably not a seaman.

I have then taken the *Freak's* and *Flowers of Ugie's* positions, to determine the place of the centre this day, particularly the last vessel's, as there can be, but little doubt of her position, as she was going free till the time she hove to; and the logs of both vessels are excellent. The *Tenasserim* and *Nusserath Shaw* are apparently out of the actual circle of the storm on this day. They were perhaps beginning to feel the monsoon, which as I shall subsequently show was making its way rapidly up the Bay.

For the centre of the 30*th April*. We find that according to Mr. Ewart's very graphic letter, the shift of wind took place at Pooree (Juggurnath) between $7\frac{1}{2}$ P.M. and $9\frac{1}{2}$ P.M., so that we may take the centre to have passed that station at $8\frac{1}{2}$ P.M. of the 30*th*. From noon of the 29*th* to $8\frac{1}{2}$ P.M. of the 30*th* is $32\frac{1}{2}$ hours, and the distance from the centre of the hurricane on the 29*th* to Pooree, is about 165 miles. Throwing away fractions, this is about 5.1. per hour, and assuming the storm to have travelled in a straight line, we find upon measuring back for these $8\frac{1}{2}$ hours, that the centre at Noon falls about 40 to 45 miles to the SW. of Pooree. This also agrees with the log of *La Belle Alliance*, which vessel had the shift of wind—and she probably passed through, or close to the centre,—at 11 A.M. This position of the centre would give the wind at the station of Pooree NEbE. Mr. Ewart's letter says NE., but a discrepancy of a point might occur even to a seaman; where compasses, weather-cocks, and vanes were not, we suppose, abundant; and where the tempest was also a sand-storm. To the North, we find the *Christopher Rawson* with the wind marked at SE. at daylight, and SSE. in the afternoon, but we have no statement of the wind exactly at noon, and in the state she is described, her observation of latitude must have been but a very indifferent one. Her place in the circle would give the wind to have been about SEbS., so that there is with her, also, a difference of a point, or a point and a half, only. The logs of the *Flowers of Ugie* with a gale at South, and *Vectis*, a gale at SbW. differ widely from what they should have been had the circles of the vortex extended so far as their positions. I have marked them on the diagrams, and now proceed to consider the probable cause of this discrepancy, and of that which we observe in the logs of the Pilot and Light

Vessels. I have adverted, in both my preceding Memoirs, to the probable effects produced by the interruption which a vortex may experience when approaching the land.

In this instance, as before, we must consider the storm as a fluid vortex, moving onwards and striking the extremity of the Coromandel range, with two openings, that of the valley of the Mahanuddee, and of the low country above the Balasore hills, through which to force its way, (see the second Chart to my first Memoir). It is difficult to suppose, and with the imperfect maps we possess, impossible to calculate, what the effect of this double interruption would be; but we may, I think, fairly attribute to it the diminished rate at which the storm appears to have travelled; its remarkable change of course during this last 24 hours; the "awful gusts" of wind described in the log of *La Belle Alliance*, and the discrepancies of some of the logs as to the direction of the wind.* We find, what is very remarkable, the *Elephanta* coming up along shore with the usual monsoon wind of the season, and "fresh breeze and cloudy weather," though, as will be seen by the diagram, she is not far from the circles of the *Christopher Rawson*, *Vectis*, *Beacon*, and *Freak*, all of them still in very bad weather. There can be no doubt about the *Elephanta's* position, since she had the land in sight. The "great swell from the NE." which I have marked in italics, is, clearly that of the tempest, which at this time was just approaching the unfortunate station of Pooree. The *Elephanta's* distance from the centre of this day is considerable, being 163 miles, which would require the vortex to have been 326 miles in diameter, to have reached her.

Taking the nearest range of elevated land to be 30 miles inland from Pooree, we may suppose that circle of the storm upon which the *Flowers of Ugie* is placed in the diagram, to have been just impinging against it at noon, and hence perhaps the sort of *flattening* of it into an irregular oval, which gives the wind on the NE. and SE. portion,—*Flowers of Ugie*, *Vectis*, and *Christopher Rawson*,—a more southerly direction; and farther to the NE. creates the irregularity of the Pilot

* Captain Smoult of the "Freak" in a letter subsequently sent, says "at day-light on the 30*th*, the wind had hauled round (in the space of four hours) from NNW. to ESE. then back to Southward and SW. from which quarter it blew generally, till I arrived at Point Palmiras."

and Light Vessel's having the wind so far to the Eastward as EbS. to ESE.; while at Balasore it is NE. and puffy. We may on all these grounds I think, assume that the vortex had become wholly irregular, except near the centre. We should remark, however, that throughout there is no *contradiction* as to the general rule for the direction in which the wind moves; for all the evidence goes to show that in the open ocean it would have been a circular storm, blowing from right to left.

For the centre of the 1*st May*, we have to consider that the monsoon wind was making its way up along the coast; but we find that at Pooree, though abating from 4 A.M., there were still gusts at times from the SW. *La Belle Alliance* was on the verge of the southern part of the storm; but the *Christopher Rawson*, close off Point Palmiras, though the weather is clearing a little, is described as lying helpless. From this vessel's position, the report from Balasore, the wind at Calcutta, and with the Pilot and Light-vessels' logs* I have judged the centre to be about where I have marked it, but we must not forget, that to extend the circle to Calcutta, will make it one of 300 miles in diameter; and that from this point, nearly half way to Calcutta, that part of the vortex nearest the earth had, since before noon of the 30*th*, met with all sorts of obstructions; since it was travelling onwards amongst the numerous ranges of hills which bound the vallies of the Mahanuddee, the Braminy, the Byturnee, and the Subunreeka rivers, to the north of Cuttack as far as Midnapore. From this cause, we cannot on this day expect any great regularity in the direction of the winds, if we project them on circles, and we must be content to take this day's evidence as before, as proof only that the general law of direction has been always followed as far as we have any evidence.

II. *The size of the vortex.*

From what has been before said, and from the chart, it will be seen that the storm appears to have been more extensive about the 27*th*, and again to have expanded on the 1*st May*, but our evidence for both these days is incomplete. That of the 27*th*, because we have but two ships by which to be guided, and that of the 1*st May*, because the only

* I suspect some inaccuracy in the log of the "Beacon" for this day, but have not been able to verify my supposition.

evidence we have is all on one side, and within a small arc of the circle. Hence we must say, that *it appears* to have been, while crossing the Bay a vortex of about 260 miles in diameter; and that *it may have been* larger at its commencement and termination. The Coringa hurricane of *November* 1839, is, I think, clearly enough evidence of a storm contracting in size, and this may be one of a storm first contracting and again expanding? for as, in truth, we know so little of the laws which govern these phenomena, all we can do,—all at least that I can venture to do,—is to set down the evidence carefully, with such conclusions as may strike us. Our evidence, and our conclusions will all, I trust, be weighed out and scrutinized by abler hands and heads.

III. *The rate of progression of the storm.*

From the centres laid down, this will be as follows:—

27*th April*	to the	28*th*	...	...	175 miles
28*th*	to	29*th*	...	...	350
29*th*	to	30*th*	...	...	113
30*th*	to	1*st May*	...	...	175

Of these we must perhaps exclude the centre of the 27*th*, for which we have but too little evidence. It is nevertheless possible, that as the track of the storm, if it was then completely formed, crosses the lofty hills of the Andamans (2500 feet high, says Hamilton) it experienced some sort of check from them on its progress? It is a curious coincidence, that after laying down, as well as I could, the centre of the 1*st May*, I found that I had given the storm 175 miles of distance from the centre of 30*th April*, which is exactly what it appears to have made on this day when crossing the Andamans! It was forcing its road over the Cuttack hills between the 30*th* and 1*st May*, as over those of the Andamans, between the 27*th* and 28*th April*. The centre of the 28*th* must be nearly correct, being so close to the *Nusserath Shaw;* as well as that of the 29*th*, for which we have the able log and chart of Captain Smoult of the *Freak;* and that of the 30*th*, which depends upon the position and shift of wind, an hour before noon, of *La Belle Alliance*, and at Pooree $7\frac{1}{2}$ hours after noon, which do not admit of any great error.

The four distances above stated, give an average of	Miles 203	☿ day, or	Miles $8\frac{1}{2}$	☿ hour
The last three distances give ...	213	or	9	

But in both cases, the great distance travelled is that between the 28*th* and 29*th*. We cannot be far wrong in assuming this as correctly laid down, I think, when we look at the carefulness of the logs, and the remarkable rapidity with which the storm reached and passed some of the vessels? We may therefore take it as an instance of a storm in the Bay which, for this part of its track,—28*th* to 29*th*,—travelled 350 miles in 24 hours; or something more than 14½ miles per hour! *Why did it travel so slowly again, from the* 29*th to the* 30*th?*

We must take the vortex of the 28*th* and 29*th* to have been at the surface of the ocean, and, for any height with which we have to do, call it an aerial column of, say, 250 miles in diameter. Such a volume of displaced air, moving with such a velocity, must necessarily be felt at some distance preceding the line of its track. It meets as it approaches the coast with one direct obstacle, nearly at right angles to its course—the Coromandel range, and with the deflecting force of the SW. monsoon, which the *Elephanta*, we see, is bringing up along the coast. Whether these are the causes, or whether they are sufficient ones, I cannot presume to decide; they appear to me to be probable ones at least, and to account fairly enough for the decreased rate of progress and change of direction. The tracks perhaps should be laid down in curves, and not in straight lines? The facility of tracing these last, and of bringing them to fixed points at noon, have made me prefer the form of straight-lined tracks, in this and my former Memoirs, to curved ones.

On the 29*th*, the centre of the storm was 150 miles from the coast, and we may say that it was 180 miles from the first considerable range of hills; so that taking it, as is seen in the diagram, to be 260 miles in diameter, or 130 in radius, the aerial wave, which preceded it, was just about impinging on the hills at noon. How soon the re-action of this on the vortex was felt, we have no means of judging. The NE. wind experienced by the *Elephanta* on this day, when she is just on the outer verge of the storm, and which it will be noted is *against* the coast wind which she was bringing up, seems to be an effect of this atmospheric disturbance; as the "*heavy North-easterly swell*" of the 30*th* evidently is of that of the storm; the aerial wave having thus preceded the aquatic one by about 24 hours.

In tracing this storm farther inland, we have first the report from Chuprah, in Lat. 25° 46′ N. Long. 84° 46′ E. bearing about N. 8° W. 228 miles from the spot where I have placed the centre on the 1*st*

May,* which spot is in Lat. 22° N., 85° 25′ E. I have printed it, but am doubtful if it has any relation to our storm. From Mr. Ravenshaw's table, it appears, that he had a storm on the 26*th April*, another on 1*st May*, and a third on the 5*th May*, but as our centre for the 1*st May* at noon cannot be very far wrong, we can scarcely suppose that the impediments the hurricane met with can have reduced its rate of travelling so as to allow it only a motion of less than 228 miles in four days and ten hours, which is the difference between noon on the 1*st*, and 10 P.M. on the 5*th*; when, from the gale being at East, the centre must still have borne South from that station, reducing the rate of its progressive motion to perhaps 40 miles a day!

The reports from Delhi and Kurnaul, however, seem to show that the storm experienced there on the 4*th*, may have been owing to the last efforts of this one which we have been tracing. Kurnaul is in Lat. 29° 40′ N., and Long. 77° 57′ E. bearing, therefore, N. 41° W. 624 miles from our centre on the 1*st May*. From noon on the 1*st* to, say midnight, on the 4*th* are $3\frac{1}{2}$ days, and this would give the distance travelled to be 178 miles per day. In the fluctuating nature of the storm, there is much of what we might, I think, expect from impulses of the kind in the neighbourhood of high mountains, and when their forces were nearly expended. If we admit these squalls in the neighbourhood of Delhi to have been part of the Cuttack storm, we shall then have traced it from the Andaman Islands to that place!

There is one more circumstance to advert to, before closing this Memoir, which I should not omit; and this is the great amount of property which, even with what we now know, has been clearly lost by ships running headlong into the storm; and this might, in all human probability, have been saved, by heaving to for twelve hours. If the tracks of the *Nusserath Shaw* from the 27*th* to the 28*th April*, of the *Freak* from the 28*th* to the 29*th*, of the *Vectis* from the 28*th* to the 29*th*; and of the *Flowers of Ugie* from the 28*th* to the 29*th*, be examined on the chart, it will be distinctly seen, that each of these vessels ran down from 100 to 150 miles to meet, or cross, the track of the hurricane! while, at the rate it was travelling, and with the infallible warning which their Barometers and the direction of the wind might have afforded them of its approach and direction, heav-

* I have learnt that about this date a very severe storm was experienced in the southern and eastern parts of the Midnapore district, but no reports have reached me.

ing to for twelve hours would have saved them all the heavy loss which they must have incurred;—to say nothing of the awful risk of foundering, which three out of the four certainly ran. If we take the amount of losses by these ships, and that by the *Marion* and others, we shall have a very large sum; the greater part of which might probably have been saved by the simple use of our knowledge of the Law of Storms. We see that they had successively the gale increasing to a storm from North to ENE. and ESE. The centre of the vortex must then have been to the Southward and SEastward of them, and their safe plan was, to heave to, for a few hours, on the starboard tack; when, being always on the right hand side of its path, they would have had the wind draw from ENE. to SE. and SSE. as we see it did with the *Nusserath Shaw* on the 30*th* and successively with all the others. The wind would then have been about at the violence of *a gale*, as it was with the *Tenasserim;* at the very time it was dismasting the *Nusserath Shaw;* and with the *George and Mary* when it was tearing the *Freak* and *Vectis* to pieces.

The Diagrams.

As for the 27*th* we have only two vessels on opposite sides of a circle, and no shift of wind, or other corroborative evidence, I have not thought it worth while to give a diagram for this day; nor for the 28*th*, where the centre depends partly upon the rate at which the vortex may have been travelling, and partly on the correctness of the *Nusserath Shaw's* position at noon. I have already stated why I take the circle of the hurricane not to have much exceeded 300 miles on this day.

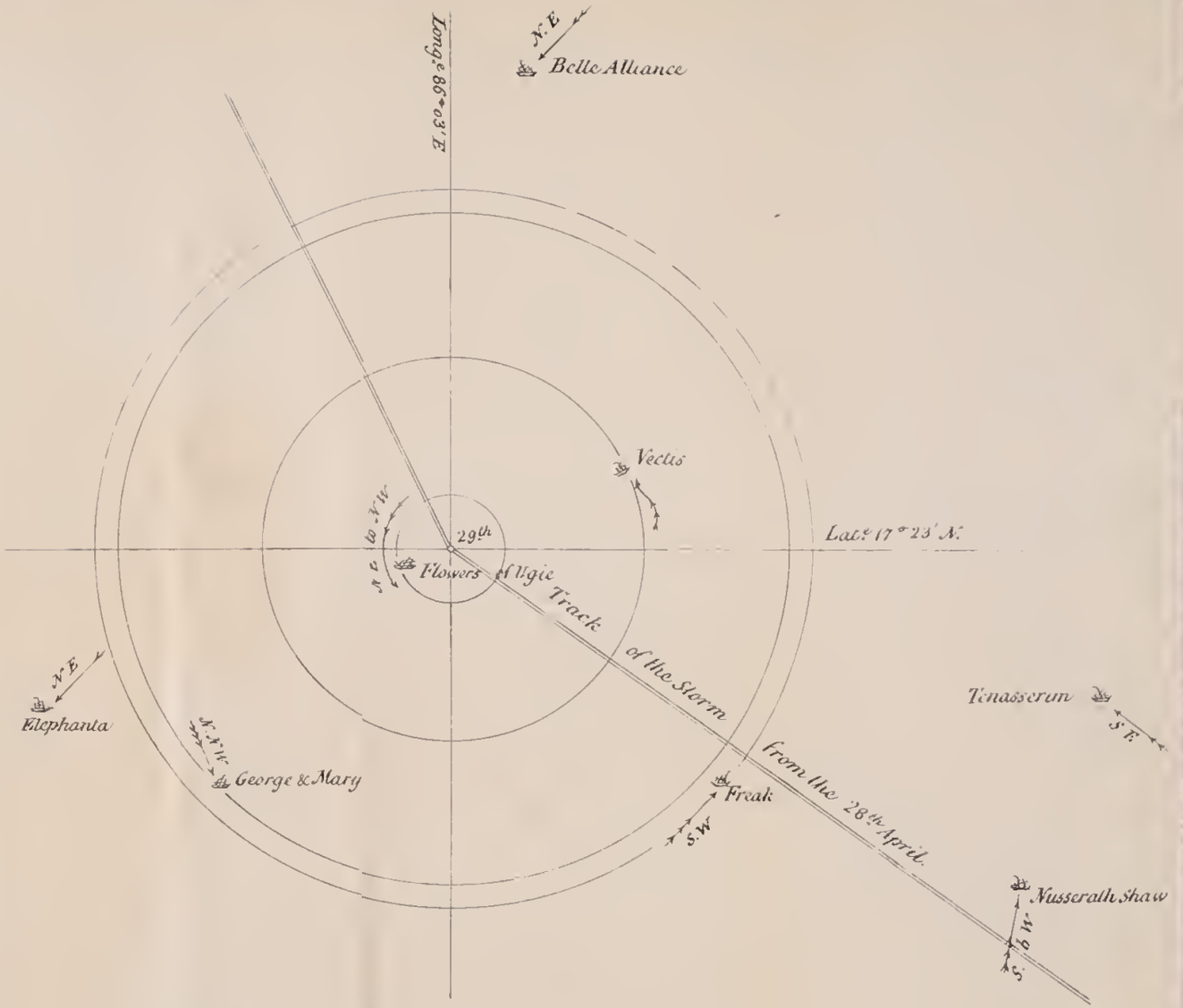
On the 29*th* and following days, however, we have several ships, and these complications require a diagram to illustrate them, which I have accordingly, as before, given for each day.

Since the foregoing pages, were placed in the hands of the printer I have been favoured by Captain Pope, of the ship *Marion*, with a copy of his protest in consequence of the dismasting of that ship. The following is a summary extract from it, altered to Civil time.

"The gale may be said to have fully commenced by noon on the 28*th April* 1840, at which time she was in Lat. 15° 10′ N. Long. 90° 15′ E., and it was then blowing a hard gale at NE. By 3 P.M. Barometer falling fast, made every preparation for bad weather. At 5h. 30′ P.M. a complete hurricane; the ship hove to on the larboard tack. A little

N°II. Diagram of the Hurricane at Noon 30th April 1840.

Outer circle 275 miles in diameter



N°I. Diagram of thHurricane at Noon 29th April 1840

Outer circle 260 miles in diameter

Oriental Lith.c Press - Calcutta.

CHART
To the third Memoir
on
THE LAW OF STORMS
IN INDIA

Showing the Tracks and Stations of Vessels and probable course of the Hurricane in the Bay of Bengal 27th April to 1st May 1840

BY

HENRY PIDDINGTON

Rungpore
Chilakhat
Malda
Jumalpore
Jungipore
Moorshedabad
Dacca
Comillah
Kishnugur
CALCUTTA
Burrisal
Chittagong
Akyab
Khedgeree
Hidgellee
Balasore
Pt Palmiras
Cuttack
False Pt
Christ[s] Mansion
Poorie or Juggernath
Black Pagoda
Ganjam
Khyook Phyoo
Cheduba
Bimlipatam
Vizagapatam
Coringa
Masulipatam
Pt Divy
Pt Negrais
MADRAS
Sadras
Pondicherry
Tranquebar
Pt Calimere
Pt Pedro
Sarah
Elephanta
Preparis
Cocos
Narcondam
Andaman Is
Barren I
Centinel
Flowers of Ugli
Belle Alliance
Vestal
Freak
Track of the Hurricane
Centre 29th
Centre 30th
Centre 28th
Centre 27th April 1840
27th April to 1st May 1840

References

A Hurricane is designated by
A strong or heavy Gale
A Gale
Wind variable or unsteady

Printed Lith[o] Bur Calcutta

after 6 P.M. lost all three topmasts and both cutters. At 7 P.M. wind veered to the Northward and Westward at 7h. 30′, blowing a severe hurricane; Barometer 28·00 inches, ship a complete wreck; wind veered round to Southward; a heavy sea struck the stern and stove in the upper dead lights. At 8 P.M. Barometer rising, but still blowing *beyond description*; the gig blown away during the night; 2 feet water in the well. Midnight gale moderating. Barometer 29·00; ship lurching heavily.

"29*th April.* Daylight moderating. Bar. 29.50."

The Chart having been lithographed before this log reached me, I could not place the *Marion* upon it; but as she must have drifted to about Lat. 15° 00′ N., Long. 90° 00′ E. at 7-30 P.M. and these lines intersect each other; her position will be easily seen; as being about 115 miles from the centre of the storm on the 28*th*; which as we see by the veering of the wind, passed to the Northward of her at about 7h. 15′ P.M. giving a velocity of 16½ miles an hour for this short space of time; while as we have seen, the average velocity for the twenty-four hours was 14½ miles. This is good evidence of the truth of our work.

Proceedings of the Asiatic Society.

(Wednesday Evening, 3rd February, 1841.)

The Honorable Sir E. RYAN, in the Chair.

The following gentlemen proposed at the Meeting of the 13th January last, were ballotted for, and duly elected; viz.

Capt. W. R. FITZGERALD.

C. B. TREVOR, Esq.

RAJA KHAN BEHADOOR, Khan of Gyah.

The necessary communication of their election, and rules of the Society for guidance, were ordered to be forwarded to the parties.

Capt. W. SMYTH, Bengal Engineers, was proposed a Member by G. A. BUSHBY, Esq. seconded by the Officiating Secretary.

Library and Museum.

Carey's Principles of Political Economy, 8vo. 3

——— Essay on the Rate of Wages, 8vo. 1

——— Credit System in France, Great Britain, and the United States, ... 1

——— Answers to the Question—"What constitutes currency?" &c. &c... *Presented by the Author*, ... 1

Pickering's Eulogy on Dr. Bowditch, ... 1

Tyson's Discourse on the Surviving Remnant of Indian Race, ... 1

——— Memoir of T. C. James, ... 1

Du Ponceau and Fisher's Memoir on the History of the Celebrated Treaty made by W. Penn, ... 1

Oriental Christian Spectator. New series, vol. 1st, No. 12, ... 1

11th Report of the Inspectors of the Eastern State Penitentiary of Pennsylvania, ... 1

Journal of the Academy of Natural Science of Philadelphia, vol. 8th pt. 1st 8vo. 1
Calcutta Monthly Journal, &c. 3rd series, No. 73, ... 1
Madras Quarterly Medical Journal, vol. 3d. No. 19, ... 1
Murray on the Topography of Meerut, Calcutta, 1839, ... 1
Communication, Faiteà la Société Philosophique Américaine. Philadelphia, 1840, ... 1
Dewan Waheed MSS. (in Persian) 8vo. Presented by Rajah Soorag Narain Roye, ... 8

The following report was submitted by the Officiating Curator for the month of January last:—

H. W. Torrens, Esq.,

Sir, *Secretary, Asiatic Society.*

I have the honor to submit my report for the month of January.

"*Paleontological, Geological, and Mineralogical Departments.*—I have proceeded at every spare moment, in arranging the collections most in need of it, but I have been so often interrupted in this, by the necessity of searching out names, localities, &c. that I have commenced a tabular index to the Society's Journal, of matters relating to these departments, which will not only save much time to the Curator of the Museum, but be of great use to visitors and students; as if printed at the end of our Catalogues, it will form both a summary and a table of references. This is particularly needed by strangers, who do not know what we have been doing of late years, and what we possess; or who do not know where to look for papers referring to the subjects or localities, on which they may desire information. Four volumes of the eight published ones of the Journal, are thus indexed, and page 1 of the index is sent herewith, for inspection.

The duplicates of Captain Hutton's Himalaya specimens, are packed for transmission to the Honorable the Court of Directors. I have carefully compared and assorted the two series, so as to insure their perfect correspondence.

"*Osteological and Mammalogical Departments.*—Nothing new to report.

"*Ornithological Departments.*—The duplicates in this department are all packed for transmission to the Court of Directors; being 270 specimens.

"*Fishes, Reptilia, &c.*—Our duplicate snakes also (66 specimens) are packed for transmission to the Court of Directors.

"The additions to the Museum this month have been as follows:—

Dr. T. R. Roth, { 3 specimens, Procellaria capensis, Stormy Petrel, or Mother Cary's Chicken.—Stuffed and mounted.
1 specimen, Diomedia Chlororhynchos, or Yellow-billed Albatross.—Stuffed and mounted.

"Curator.—1 Specimen, Falco ater, Common Kite.—Stuffed and mounted.

"Purchased.—1 Viverra Genetta, the Genet.—Stuffed and mounted.

As. Soc. Museum, 31*st Jan.* 1841.

I have, &c. &c.
H. Piddington,
Actg. Curator, As. Soc. Museum.

The duplicate specimens alluded to, as also the duplicates of Captain Hutton's Spiti Valley Geological Collections, have been forwarded through the General Department of the Government of Bengal, for transmission to the Honorable the Court of

Directors, with reference to a resolution passed at the Meeting of the 13th January last.

Read a letter from Mr. JAMES DODD, Assay Master at Agra, offering to the Society a valuable collection of minerals chiefly Cornish; most of them good and instructive, and some few rare.

Resolved —That a communication be made to Mr. DODD, to the effect, that if he should feel inclined to take into consideration an offer for his collection of rupees 600, the Society would be recommended to purchase it, as an addition to their Museum.

The Officiating Secretary noticed the existence of a number of models of crystals in the Assay Office of the Calcutta Mint, where they were of no use, and might with advantage be placed in the rooms of the Society.

Application to the Officiating Assay Master to this effect having been made, and that Officer not appearing to come into the views of the Society as to the expediency of the removal of the models.

Resolved —That the request of the Society be submitted to the Governmcnt, so that the Officiating Assay Master may be authorized to transfer the models in question to the Museum of the Asiatic Society.

Read a letter from Mr. Secretary Bushby of the 20th January last, conveying the authority of the Supreme Government to the application of the Society of the 13th November last, to purchase certain instruments and cabinets from the collection of the late JAS. PRINSEP, Esq. for a sum not exceeding rupees 1,350.

Read letter from the Officiating Curator of the 25th January last, reporting purchase of the instruments and cabinets for rupees 735.

Resolved —That the thanks of the Society be conveyed to the Government for this grant, and that an order be issued for the payment of the amount, from the General Treasury in favour of the Secretary.

Read a letter from Professor O'SHAUGHNESSY of 21st January last, applying for the use of the Society's rooms, for a course of Lectures.

Resolved—That the Officiating Secretary inform Professor O'SHAUGHNESSY, that the President and Committee of Papers of the Asiatic Society are happy to have it in their power to facilitate the delivery of the course of Lectures he contemplates giving, on the Laws and Effects of Galvanic Arrangements, by placing at his disposal the rooms of the Society, the costs and charges of lighting being borne by him.

Read a note submitted by Mr. W. H. BOLST, Accountant to the Society, on the pecuniary grant made to the Society by the Honorable the Court of Directors, the object being to point out the real intentions of the Court, as connected with that grant.

Resolved—That as doubts are entertained by the Society, a reference be made to the Government, and through them ultimately to the Honorable the Court of Direc-

tors, to ascertain whether the Court in authorizing the Government of India to pay the amount of rupees 300 per mensem, intended it as a separate grant for a distinct purpose, in *addition*, and not in *supercession* of that made by the Government of India in July 1837, pending a reference to the Honorable the Court of Directors; and whether the larger subsequent grant is to be considered as merging in the previous smaller one, because it was made as the result of the reference from the Government.

Read a letter from Mr. Secretary BUSHBY of 13th January, covering correspondence with Capt. TREMENHEERE, respecting the Geological collections brought out by that Officer from England.

The Secretary stated, that the chamber lately occupied by the model of the Moorshedabad palace, would be available for the collections of Capt. TREMENHEERE.

Read a letter from Capt. TREMENHEERE with enclosure, on the subject of Economic Geology in India.

In submitting the paper in question, the Officiating Secretary suggested, that as the best means of availing themselves of Capt. TREMENHEERE's ingenious production, the Editor of the periodical, called the Journal of the Asiatic Society, be supplied with a copy, and requested to give it as early publication as he can conveniently, in his Journal.

As Editor, the Secretary begged to state, that not only would the paper be inserted if entrusted to him in the Journal, but any number of extra copies supplied to the Society for distribution to whomsoever they please, with no other charge than the cost of the paper they are printed on.

The suggestion of the Secretary was agreed to, and the paper furnished for publication, as proposed.

Read a letter from Mr. C. VISSCHER, Secretary to the Batavian Society of Arts and Sciences, forwarding results of tide observations in the Archipelago of Batavia, during the year 1839.

Resolved—That the civility be reciprocated, by transmitting to Mr. VISSCHER for presentation to the Batavian Society of Arts and Sciences, copies of Registers of the rise and fall of the tide at Pulo Island and Singapore, received through the General Department of the Government of Bengal, during November and December last.

Read a letter from Mr. Deputy Secretary Young, of 29th December last, requesting to be favoured with full information regarding the Zoological Collection by the late Dr. HELFER, alleged to have been made over to the Asiatic Society's Rooms.

The Officiating Curator having been requested to furnish a report on the subject; submitted the following:—

To H. W. TORRENS, Esq.
Secretary Asiatic Society, &c. &c.

SIR,

With reference to letter No. 17, from the Deputy Secretary of the Government of Bengal, conveying a request from the Right Honorable the Governor of Bengal, to "be furnished with full information regarding the Zoological collection alleged to have been made over to the Museum of the Society" by the late Dr. HELFER; I have the honor to report that—

1. It appears by the Society's proceedings of 10th December, 1838, that the *Or-*

See pp. 836, 337, of Journal Asiatic Society herewith sent No. 81 for September 1838.

nithological part only, of Dr. HELFER's collection was originally deposited at the Asiatic Society's rooms; the Honorable the President in Council having referred to the Society, as per Mr. Secretary PRINSEP's letter, of 12th September, 1838, soliciting its advice and assistance, generally in the matter; and also as to the separation of the specimens, that could be spared.

2. That the division of the collection into three parts, as recommended by the Museum Committee, was made at the Museum; and that of these, one, being packed by the Curator and Assistants, was forwarded to Government for shipment to Europe, for the Honorable the Court of Directors. Dr. HELFER's part was taken away by him, at that time.

3. That of the part left for the Society, some birds were mounted, and the remainder, being 173 (duplicates) are now in the Museum.

4. These duplicates form a part of those (322 specimens in all, and mostly birds) which at our last December Meeting, I recommended being sent home to the Honorable the Court of Directors without delay; as they would be of value at home, if only for exchanging, while they had almost none here, and were necessarily fast deteriorating.

5. No collections of the classes Mammalia, Reptilia, or Pisces, from Dr. HELFER, have reached the Society, that I can learn. With the birds are three skins only of Mammalia (two monkeys and one of a squirrel), and these, no arsenic having fortunately been used in their preparation, are in a very indifferent state.

6. This remark applies equally to the birds; but it is possible that European taxidermists may succeed in mounting and repairing a very considerable number of them; and in Europe they would thus last a long time.

As. Soc. Rooms,
13*th January*. 1841.

I have, &c. &c.
H. PIDDINGTON,
Acting Curator, As. Socy's. Museum.

A copy of the foregoing paper, together with No. 81 of the Journal Asiatic Society, was forwarded for the information of the Government.

Read a letter from Dr. F. TAMNAU, Jun, of Berlin, of 8th November last, containing proposals of exchanging minerals of the East, with those from Germany, Sweden, Norway, &c.

Resolved—That the following reply be made to Dr. TAMNAU, *Jun.*

To Dr. F. Tamnau, *Jun.*
Berlin, Prussia.
Care of Messrs. Tamnau & Co. *Hamburgh.*

Sir, *As. Soc. Rooms, 3rd February,* 1841.

I am directed by the Asiatic Society of Bengal, to acknowledge the receipt of your letter under date 8th November 1840, and to express to you on the part of that Body, the lively feeling of satisfaction with which it finds itself in communication with you, particularly under circumstances which promise so much advantage to the Society, and prove in a most gratifying manner, the flattering consideration with which you regard it.

The exchange you propose is one which the Society would for itself gladly close with, but there are reasons which induce it to pause before concluding an arrangement, the terms of which are unexceptionable.

The Museum of the Society in the department of Mineralogy and Geology, has been from causes which it would be impossible now to enter upon, deprived of the advantages of systematic arrangement, so necessary, or rather so indispensable to its utility. Rich in specimens, it has been most unfortunately deficient in the means of arranging them, while difficulties of other kinds have interfered with the facility of classification to such a degree, as to leave the Society in douht even as to the real extent and value of several of the collections it possesses.

Under these circumstances, I am desired to inform you, that the Society would rather propose to commence the interchange of specimens, than suffer you to do so; lest it should so happen, that the value of what it would he in a position to offer, should he incommensurate with that of the collection which you might forward.

I shall take occasion to address you again on this subject, as the gradual arrangement of the Museum proceeds, begging in the mean time to inform you, that the list you have furnished will he carefully borne in mind, and specimens, if availahle, put aside for transmission to you through Messrs. Allen and Co., Booksellers, Leadenhall Street, London; to whom all communications to the Asiatic Society of Bengal, may be at all times addressed.

Be assured, Sir, of the sentiments of respect, and esteem with which

I have, &c.

H. Torrens.

Read a letter from Capt. T. S. Burt, forwarding Copy of an inscription from the neighbourhood of Mount Aboo, and detailing the result of his researches there, and elsewhere in Rajpootana.

Read communications from Capt. Hutton, regarding his late visit to Killa Bheest, near Khelat, in search of inscriptions.

Read a paper from Lieut. Baird Smith, on the practical properties of the Galvanic Battery.

Read a paper from Dr. Jameison, regarding some interesting Geological discoveries.

The Secretary informed the Meeting that the communications from Capts. Burt and Hutton, Lieut. Baird Smith and Dr. Jameison, would he published in early numbers of the Journal.

Read a letter from Major Rawlinson of Candahar, offering for publication in the Journal of the Asiatic Society, his Memoranda on the Persepolitan inscriptions, and his copies of them. It was observed by the Secretary, that anxious to give the Society the credit of first publishing the results of that distinguished antiquary's important discoveries, he would place the material, on its arrival from Candahar, at the disposal of the Society for publication in the Transactions of the Society, a course, observed the Secretary, he thought best calculated to give the record of Major Rawlinson's priority of discovery a permanent existence, while, in order to meet that Officer's wish, that this right should he asserted as soon as possible, he would anticipate matters, by giving the letter press in the Journal, as from the Transactions, while engravings of the cunciform inscriptions were being prepared.

Referred to the Committee of Papers.

On the proposal of the Honorable the President, Sir E. Ryan, seconded by the Honorable H. T. Prinsep, the Officiating Secretary (H. Torrens Esq.) was appointed Secretary to the Asiatic Society of Bengal.

For the presentations and contributions, the thanks of the Society were accorded.

Misapprehension appearing to exist in some quarters as to the real character of this Journal, and the Members of the Asiatic Society having been alluded to with reference to the mode in which it is conducted, the Editor thinks it proper to state, for the information of those who may not be aware of the fact, that he is alone answerable for its contents, and for its management.

The Asiatic Society of Bengal has no controul over, nor concern with, this Journal save as a subscriber to it.